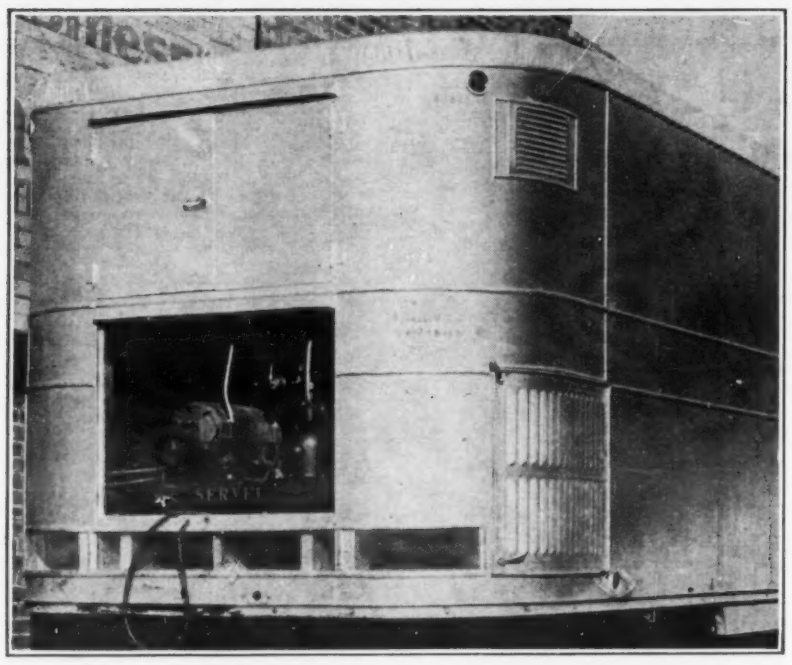
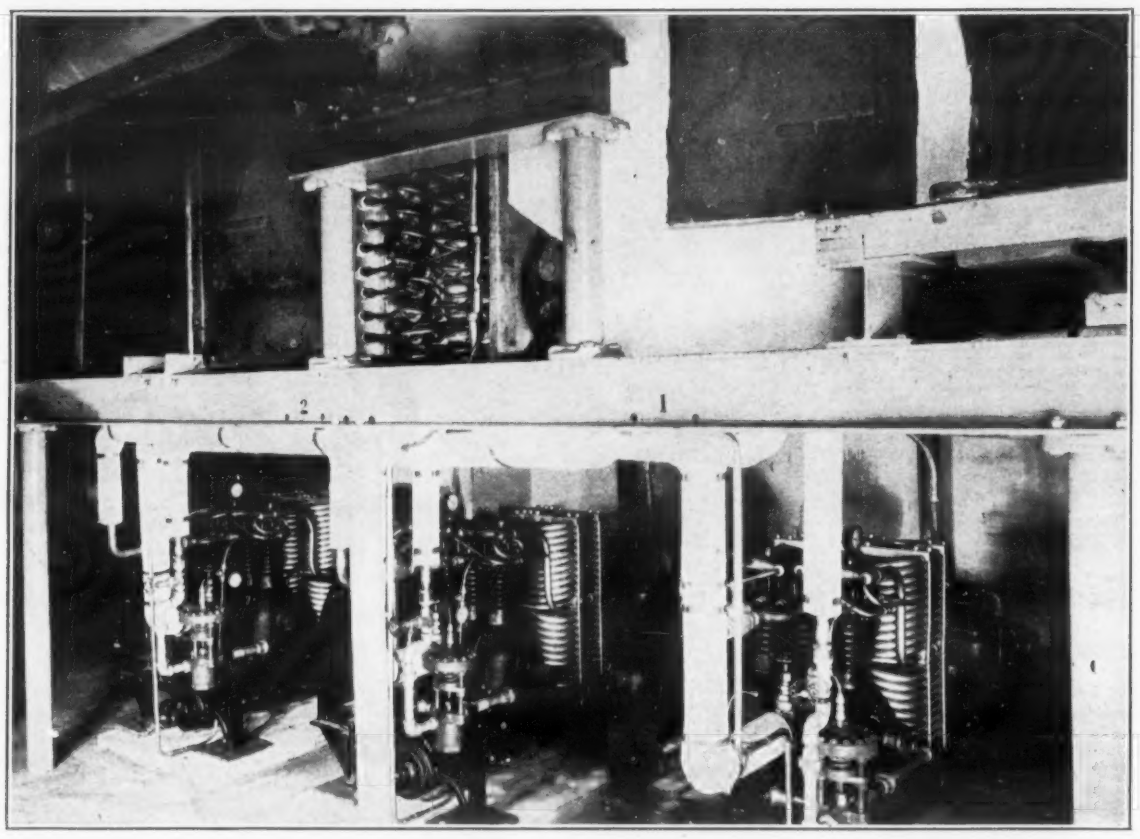
Special Applications of Commercial Refrigeration



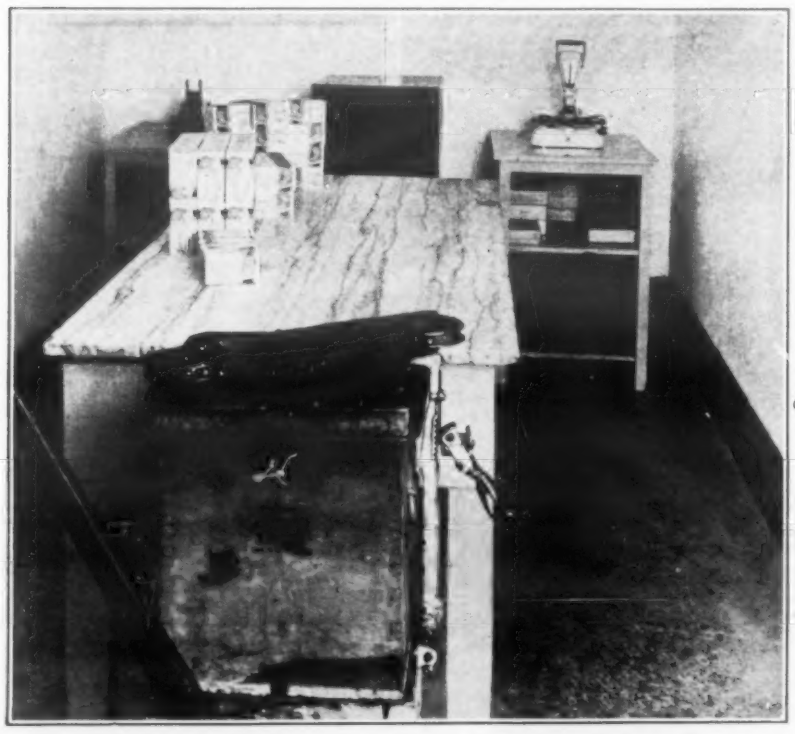
Fedders coils and a Servel gasoline-driven compressor kept 7 to 9 tons of meat at 34° in this refrigerated truck on a trip from Denver to Los Angeles.

In the research laboratories of Washington, D. C.'s Walter Reed Hospital, this Westinghouse refrigerator (cabinet by Seeger) preserves and keeps cultures in the proper state of development.

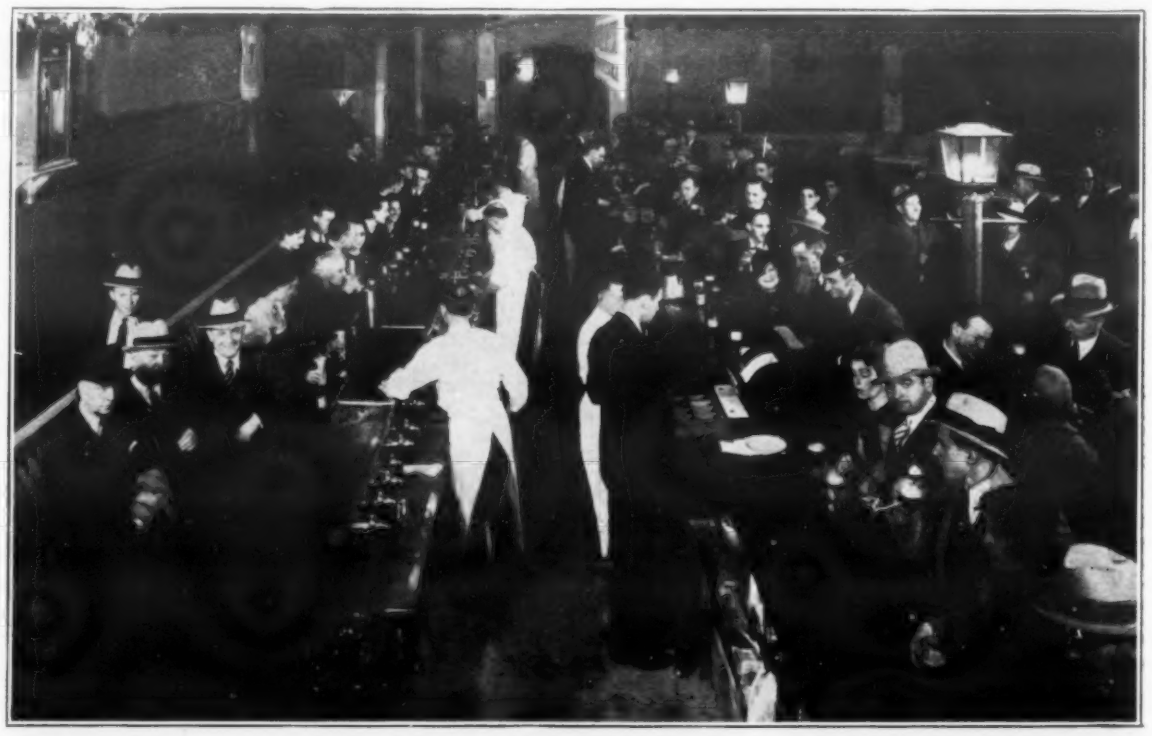


Three 10-ton Universal Cooler compressors supply refrigeration for the air-conditioning system in Rheaumes Restaurant, Detroit. Note the individual thermostatic expansion valve on each coil section of the cooling unit.

Foods for patrons of Cooley's Cupboard in Evanston, Ill., are preserved in this large storage refrigerator manufactured by Seeger.



Frigidaire air conditioning preserves the texture of brick butter in this wrapping room of the Van Wert Dairy, Van Wert, Ohio.



Crowds are seldom so large that this 25-tap bar, made by Liquid Carbonic Corp., cannot supply the demand. It was used at the brewers' recent convention in Chicago and the Artist and Models Ball.

THE NEWSPAPER OF THE INDUSTRY

ELECTRIC REFRIGERATION NEWS

WRITTEN TO BE READ ON ARRIVAL

Registered U. S. Patent Office

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SERVEL TO BUILD COMPLETE LINE OF CONDITIONERS

'Package' Milk Cooler Included in 1934 Products

EVANSVILLE, Ind., Dec. 12.—All field representatives for both Servel and Electrolux refrigeration products are in council at the factory here this week with the Servel-Electrolux management, hearing policies for the coming year, and getting a preview of the 1934 lines. More than 110 men are taking part in the meetings.

Among the products being shown the field representatives is a complete line of Servel air-conditioning units, a Servel "package" milk cooler (refrigerating mechanism is mounted on the cover of the tank), and the new kerosene-operated Electrolux refrigerator for use in areas not served by electrical power transmission lines.

Servel Hermetic refrigerators will

(*Concluded on Page 15, Column 3*)

VON MEYER NEW COPELAND COMMERCIAL SALES HEAD

MT. CLEMENS, Mich.—W. G. Von Meyer has been appointed commercial sales manager of Copeland Refrigeration Corp., according to E. A. Costa, general manager.

Mr. Von Meyer has been connected with the refrigeration industry for the past 10 years, having joined the engineering department of the Nizer Corp. in 1923. For a time he headed

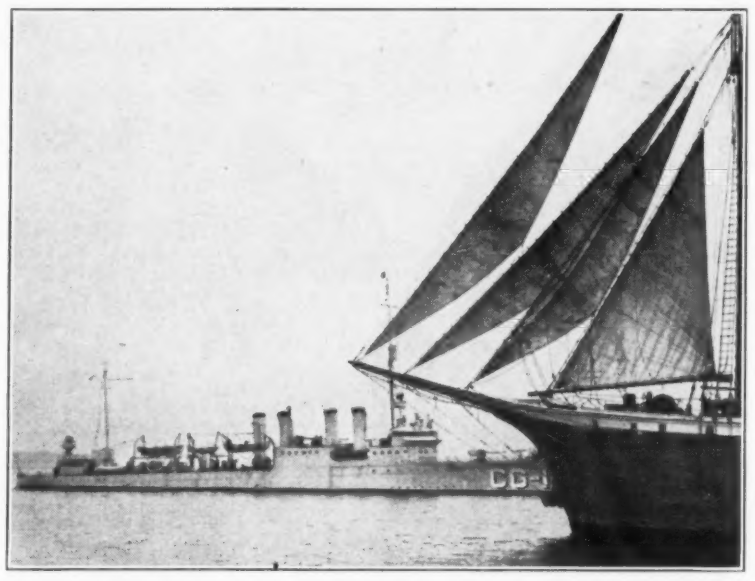
(*Concluded on Page 15, Column 4*)

WILLIAMS & MARSHALL TO BE PERMANENT RECEIVERS

CHICAGO—LeRoi J. Williams and Thomas L. Marshall, appointed temporary receivers of Grigsby-Grunow Co. on Nov. 24, were made permanent receivers of that organization by an order issued Dec. 5 by Judge John P. Barnes of the U. S. District Court here.

The order authorized Mr. Williams, general manager of the company, and Mr. Marshall, a Chicago attorney, to operate the organization as a going concern.

Frigidaire, Ahoy!



City officials greeted the Frigidaire schooner Seth Parker when it sailed into Boston harbor Dec. 9, escorted by the destroyer, Herndon.

Boston Fireboats Greet Seth Parker

BOSTON—Shrieking whistles and screaming sirens of hundreds of vessels in Boston Harbor welcomed the four-masted schooner *Seth Parker* on Dec. 9 as she came into the harbor under full sail escorted by three Boston fireboats giving her the water salute, the coast guard destroyer *Herndon*, and scores of smaller craft.

As the picturesque windjammer docked at historic T wharf, Fire Commissioner Eugene M. McSweeney, John S. Pfeil, general manager, Frigidaire Corp. of New England, and other officials greeted Capt. Phillips Lord as he boarded the senior fireboat. The official welcoming party then boarded the schooner and Commissioner McSweeney expressed Mayor James M. Curley's pleasure upon having Lord visit Boston.

At noon Mayor Curley tendered a reception and luncheon to Mr. Lord, E. G. Biechler, president of Frigidaire Corp., H. W. Newell, vice president of Frigidaire, and B. B. Geyer, president of the Geyer company, Frigidaire's advertising agency. The luncheon was

(*Concluded on Page 6, Column 5*)

GRUNOW LAUNCHES EXPANSION PROGRAM

CHICAGO — A $500,000 expansion program for the refrigeration division of General Household Utilities Co. here, manufacturer of Grunow refrigerators and radios, was announced last week by William C. Grunow, president.

Approximately $400,000 of the sum is being spent for machinery to be used in the refrigerator cabinet plant at 2650 N. Crawford Ave. Balance of the appropriation will go into plant addition and improvement.

Machinery purchased by the company includes a bank of 400-ton presses for stamping the one-piece cabinet fronts, and a bank of 250-ton pressure presses for embossing the back panel.

The 400-ton presses weigh 250,000 lbs. each, and have a height of 24 ft., 9 in. The dies along weigh 9 tons. Each press has a capacity of six fronts per minute. Larger presses will be manned by crews of four men.

A safety button must be pushed by each man to signify that all is clear before the presses start functioning. All presses are motor-operated, individually controlled, are of the

(*Concluded on Page 15, Column 3*)

Refrigerating Engineers Report On Research & New Products

A. R. Stevenson of G-E Becomes President Of Society at Annual Winter Meeting

By John T. Schaefer

NEW YORK CITY—To hear a three-day program that was packed full of technical information on air conditioning, new research into refrigerating engineering, and a number of new products for the refrigeration industry, some 200 engineers congregated here last week for the 29th annual winter meeting of the American Society of Refrigerating Engineers. Convention headquarters were maintained at the Hotel New Yorker.

Highlights of the technical program were Harry Edwards' description of a new expanded rubber insulation, Walter Fleisher's exploration into condensing water problems in air conditioning, H. A. Whitesel's explanation of an improved method of making load tests on household refrigerators, and the session on air conditioning over which George Bright presided Friday morning.

These and other discussions given at the convention are reported completely in this issue of ELECTRIC REFRIGERATION NEWS.

A. R. Stevenson, Jr., research engineer of General Electric Co., Schenectady, N. Y., became president of the society with last week's meeting, succeeding A. W. Oakley of the Merchants Refrigerating Co., New York City, who served as president during the past year.

Harry Harrison of Carrier Engineering Corp. became first vice president of the society, being succeeded in the second vice president's office by Sam Bloom, consulting engineer of Chicago. C. T. Baker, consulting engineer of Atlanta, Ga., was elected treasurer.

New directors elected to serve for

(*Concluded on Page 16, Column 1*)

39,965 UNITS SOLD IN PHILADELPHIA AREA

PHILADELPHIA—During the first nine months of this year, 39,965 household electric refrigerators with a retail value of $7,009,950 were sold in the Philadelphia territory, it is revealed in a survey just completed by the Electrical Association of Philadelphia.

A tabulation of the association's survey appears on page 10 of this issue.

This represents an increase of 37 per cent in unit volume over the corresponding period of 1932, according to George R. Conover, managing director of the association, and a 10 per cent increase in dollar volume.

(*Concluded on Page 10, Column 3*)

REFRIGERANTS ARE SHOWN BY VIRGINIA SMELTING

NEW YORK CITY—Twin exhibits of boiling sulphur dioxide and boiling methyl chloride, prepared by the Virginia Smelting Co., were among the best-attended sections of the Chemical Industries Exposition at Grand Central Palace Dec. 4 to 9.

Visitors to the Virginia Smelting Co. booth could see these two refrigerants boiling behind glass (see illustration on page 14 of this issue), methyl chloride at –10.6° F., and sulphur dioxide at 14° F.

These temperatrues were maintained in the glass-enclosed compartments which held the refrigerants by a thermostatic suction line control. Rising temperatures caused the suction

(*Concluded on Page 15, Column 4*)

SWEDISH INTERESTS BUYING BLOCK OF SERVEL STOCK

EVANSVILLE, Ind.—Sale of 100,000 shares of stock in Servel, Inc., to A. B. Elektrolux of Sweden will be consummated early next year if present stockholders agree in a special meeting called for Jan. 5. This contemplated purchase does not involve the passage of control in the company, according to H. H. Springford, president of Servel.

NEW IDEAS IN AIR CONDITIONING, INSULATION & TESTING

Harry Edwards Presents First Data On Expanded Rubber Insulation

NEW YORK CITY—A new type of insulation, apparently applicable to refrigeration systems, was described by Harry D. Edwards of the Union Carbide Co. before the Wednesday morning session of the American Society of Refrigerating Engineers here. Title of Mr. Edward's paper was "Expanded Rubber Insulation."

The material, now on the market under the proprietary name Onazote, was first made in an English factory before the war, he related. Its discovery was made through efforts to construct an insert for a pneumatic tire which would prevent its complete collapse when punctured and still remain resilient enough to permit driving the car.

Experimental work and production were resumed in 1921 by the Expanded Rubber Products, Ltd., with a plant in Wembly, Eng., which in 1929 finally started to fill commercial requirements, according to Mr. Edwards.

The material is a vulcanized rubber product, highly expanded by gas under pressure, and when viewed under a microscope shows a structure made of numerous minute cells bounded by rubber membranes. He described it roughly as a solid made by attaching together millions of rubber walls, and showed a lantern slide of a microphotographic section of the substance.

The process of manufacture he likened to the baking of bread in that it requires a "dough" composed of crude or re-processed rubber, and some rubber fillers, the exact mixture

(*Concluded on Page 12, Column 4*)

Whitesel Explains G-E Method Of Testing

NEW YORK CITY—Conducting a load test on household refrigerators by a new method which employs an electric lamp to reproduce the food load and a thermos bottle to vaporize moisture for the door-opening load, was described by H. A. Whitesel of the General Electric Co., Fort Wayne, Ind., at the A.S.R.E. convention here.

Assuming that the purpose of a load test on a household refrigerator is to determine its performance under actual field conditions, the total load applied should then include a food load, an ice-making load, and a door-opening load, Mr. Whitesel said.

The customary method of applying the food load has been to charge containers filled with warm water into the cabinet, and the only accurate method of applying the door-opening load has been to duplicate field conditions by controlling the ambient temperature and humidity, and actually opening and closing the refrigerator doors, he pointed out.

In the G-E method presented to the A.S.R.E. meeting, the equivalent of food and door-opening loads is obtained by adding heat to the inside of the cabinet by means of a lamp and

(*Concluded on Page 12, Column 1*)

NEW DATA GIVEN ON CONDENSING WATER IN AIR CONDITIONING

NEW YORK CITY—Variations in capacity of refrigeration systems, ranges of horsepower required with different temperatures of condenser water, and quantities of condenser water required under various conditions of suction and head temperatures with different refrigerants were shown in a new series of curves presented by Walter L. Fleisher, consulting engineer, before the A.S.R.E. convention here last week.

In working with the high-suction pressures employed in air conditioning, Mr. Fleisher had found charts above 35° F. inadequate. The data in his paper was the result of his determination to provide data on higher suction pressures, and also on general performances at increased water temperatures.

The data presented were theoretical in that they were not adjusted for mechanical or volumetric efficiencies of the refrigeration system, Mr. Fleisher said, hence values indicated in the charts and curves are only a part of the actual requirements for any particular refrigerant or refrigerating machine.

The refrigerants considered were ammonia, methyl chloride, Freon, and water (as used in the steam ejector), these being the most common gasses for air conditioning.

For a standard condition for ammonia, methyl chloride, and Freon,

(*Concluded on Page 11, Column 1*)

Mechanical Units Best for Car Cooling, General Electric Man Says

What Is a Ton of Refrigeration, They Ask

NEW YORK CITY—What is a ton of refrigeration? That is a question which was raised and thoroughly aired in one of last week's A.S.R.E. meetings without finding an answer which satisfied even a majority. It is a question which has been facing a committee of the society since its recent appointment to settle the problem.

The question arises from an ambiguity in the A.S.R.E. definitions of a *standard ton* as a quantity of 288,000 B.t.u., and a *standard commercial* ton as a rate of 200 B.t.u. per minute or 288,000 B.t.u. per day. Both of these expressions have been shortened to "ton" in common usage, with the result that nobody now knows whether a ton is a *rate* or a *quantity*.

A. B. Stickney of New York supported the proposition that the ton is a rate in an article in the November issue of *Refrigerating Engineering*, while David L. Fiske took the other side—that the ton is a quantity. Proposals for solution of the dilemma are made by both men in that article.

Discussion at Wednesday's open forum on the subject revealed the fact that most engineers use ton as a rate,

(*Concluded on Page 16, Column 4*)

NEW YORK CITY—Mechanical refrigeration systems for the air conditioning of railway passenger cars are used on more cars than either the steam-jet systems or ice, the popularity of the mechanical type being due to a recognition of its flexibility and the inherent limitations of the other systems, F. L. Sahlmann of the General Electric Co. declared in his talk before the A.S.R.E. meeting held here last week.

"Railway air-conditioning problems are quite different in many ways from those encountered in the commercial and industrial fields," Mr. Sahlmann stated. "Among the things on which particular emphasis is placed are the following:

"1. From the physical standpoint, the apparatus must be compact, in view of the severe space limitations encountered. Space in the clerestory is usually less at a premium than that under the car, particularly on such cars as diners, but even then very severe space restrictions are encountered. By way of illustration, the maximum overall height and width permissible for a cooling unit, if it is to be generally applied, is 18 in. and 36 in., respectively. Similarly the equipment mounted underneath the car cannot be over 26 in. high or 40 in. wide, if it is to be more or less universally applied.

"2. The equipment must be as light in weight as possible consistent with ruggedness and reliability. It costs the railroads approximately 35 cents for

(*Concluded on Page 14, Column 1*)

BY GEORGE F. TAUBENECK - - -

Stoopnagel and Budd, G-M Boosters

Ever since we began making Detroit-New York journeys for the NEWS, we have counted on finding someone from the industry on the train.

On the last New York trip, for instance, there was the always-interesting "DOC" PHILIPP, highly respected Kelvinator engineer.

But on the return trip the rule was broken. A canvass of the cars failed to reveal a single reader of the NEWS.

We did find, however, F. CHASE TAYLOR (the "Colonel"), BUD HULICK ("Budd") and NELSON S. HESSE (manager) of the "Col. Stoopnagel and Budd" radio act, and joined them for a pleasant hour. They were on the road to Detroit to attend a Pontiac sales meeting.

These highly original funsters turned down a bid for the coveted Camel cigarettes program to broadcast for Pontiac again this winter.

They're honest and sincere boosters for Pontiac and General Motors, and really enjoy the task of appearing before a sales meeting.

For 1933 Pontiac set itself a quota three times its 1932 quota. By June of this year the 1933 quota was already made! Taylor and Hulick are proud of their part in that splendid showing.

Intelligent and personable, these young men seem much more like sales executives than radio gagsters.

* * *

Air Conditioning And the A.S.R.E.

Chief topic of the hotel room and mezzanine discussions of A.S.R.E. men at the New Yorker last week was, as you might suspect, air conditioning.

Although every discussion was an argument, the hopeless bewilderment which has characterized engineering conclaves, formal or informal, on air conditioning was not present.

There was a definiteness of purpose and a sincere conviction in the speeches and conversation on the subject which indicated that at last refrigeration engineers are getting somewhere.

Men like GLENN MUFFLY and HARRY WILLIAMS are concerned over the patent situation (discussed in our editorial, "Air Conditioning Needs Leadership" in the Nov. 22 issue of the NEWS), and the willy-nilly presentation of all sorts of truck as air conditioning (treated in the same editorial). Nevertheless, they feel that the art of manufacturing comfortable weather is rapidly becoming a science, and that its commercialization on a big scale is "just around the corner."

(Which reminds us, irrelevantly and irreverently, of a sign over a New York bowling alley: "Good Times Are Just Around THIS Corner.")

* * *

Child Photographer

As you will note on this page Engineering Editor JACK SCHAEFER and the writer made a tour of New Yorker rooms in which ASRE men were registered Thursday night, and photographed the engineers while they were dressing for the banquet and party.

C. H. TANGER of Servel noticed that we were using one of the new miniature Graflex cameras, and told us he was an old friend of WALTER FOLLMER, president of Follmer-Graflex.

Moreover, he pulled out of a wallet two remarkable photographs of his own children, with which he had taken prizes in national contests.

Get him to show you these snapshots sometime. You'll love 'em.

* * *

Quick-Frozen Foods

Talked with GARDNER POOLE, pioneer of the quick-frozen foods industry and executive of General Foods Corp., and learned that sales of Birdseye quick-frozen foods are steadily increasing, and that the New England territory is pretty thoroughly blanketed with outlets.

New York and Pennsylvania are absorbing more and more Birdseye products, and distribution has been extended even to Chicago.

The Birdseye line now includes practically every fruit, vegetable, and meat cut that can be frozen.

Price continues to be the major sales resistance obstacle.

* * *

A. H. Eustis Raises A Point of Law

Together with his brother, F. A. EUSTIS, and his general manager, C. W. JOHNSTON, A. H. EUSTIS runs the Virginia Smelting Co., which has long been one of the industry's leading suppliers of sulphur dioxide.

Their factory is in West Norfolk, Va.; main offices are located in Boston.

At the Fourteenth Chemical Industries Exposition, held in New York City's Grand Central Palace during the week of Nov. 4, they fostered an interesting exhibit of boiling methyl chloride and sulphur dioxide (see picture on page 14 of this issue).

President A. H. Eustis, a tall, spare man with an engaging and ever-present grin, raised a point in a conversation with us at that exhibit, which is a dandy for the Hot Stove League.

Virginia Smelting has recently added methyl chloride to its line of refrigerants. Experimentation with dichlorodifluoromethane (known generally as F-12, or Freon) has convinced Mr. Eustis that they can produce that refrigerant economically.

Through ownership of the Midgely patents, however, General Motors apparently controls the rights to this much-bandied refrigerant.

Mr. Eustis raised this point:
The Midgely patent on dichlorodifluoromethane covers its use as a refrigerant. When a customer buys a dichlorodifluoromethane compressor, does he buy also the right to use dichlorodifluoromethane in that compressor?

If so, could he not purchase new charges of dichlorodifluoromethane from an independent source, such as Virginia Smelting?

Mr. Eustis will be glad to hear comments and opinions on that point. What's yours?

* * *

Freon Progresses

Incidentally, W. W. RHODES, sales manager of Kinetic Chemicals, the duPont concern which makes Freon, tells us that sales this year of Freon set a new high, and that next year should be far better.

All of the old-line refrigeration manufacturers, members of the Refrigerating Machinery Association, such as York, Frick, Carbondale, and Carrier (through Brunswick-Kroeschell) are now building Freon machines. Likewise many major manufacturers of the Nema group, such as Frigidaire (of course), Kelvinator, General Electric, and Westinghouse.

Air conditioning is providing one of the major reasons for widespread use of dichlorodifluoromethane. Although it is not being neglected in the commercial and household fields.

Edison and Hamlet

It's an old story as to how the invention and development of electricity caused an industrial revolution in this and other countries, but it hadn't occurred to us before that electricity has affected even the art of play writing.

Appearing in a current magazine is a biography of "UNCLE DAN" FROHMAN, who has spent half a century in association with the theater, and who says that the development of lighting has been a big factor in changing the technique of staging and writing plays.

Says the sketch:

"The decline of the soliloquy was another stride toward modernism, and THOMAS EDISON was responsible for this, according to Frohman. In the days of oil lamps, soliloquies were necessary, he says, because the light was not strong enough to enable the actor to convey much detailed information by changes of expression.

"When the electric bulbs came in, however, a pregnant leer was enough to reveal an actor's mental operations and the confidential oration to the audience became unnecessary."

Enter Edison. Exit Hamlet.

* * *

Air-Conditioned Automobiles

A recent United Press dispatch from Lindsay, Calif., tells the following tale:

"There's no need to swelter while driving in midsummer heat, Mr. and Mrs. Allen Jack of Lindsay insist.

"Here's their recipe:

"Put a large cake of ice in a pan besides the gear shift lever; open the cowl ventilator; close all windows except one at the rear, and leave that one open but an inch.

"The air drawn into the car through the cowl passes over the ice and is cooled before it filters its way out the window, they explained. They claimed they could reduce the temperature inside their car 10 degrees under that outside."

Engineers Caught While Preparing for A.S.R.E. Banquet and Party

Auditorium's Mr. Vanderwerker rests by reading the patent page in Electric Refrigeration News before dinner.

Dick Townsend, Detroit Lubricator's eastern representative, braces up his trousers with a firm hand.

Irving Knudsen of Detroit Lubricator ties a four-in-hand neatly.

Putting the finishing touches on his dinner clothes—D. P. Heath, consulting engineer from Detroit.

E. R. Fitzgerald, G-E engineer from Schenectady, pulls his Tau Beta Pi key carefully into position.

J. J. Marshall, sales manager for Melchior, Armstrong & Dessau, is practically ready.

C. H. Hall of Newark puts on a pair of rubbers before leaving his room to brave the wintry blasts.

All set and ready to go—W. M. Timmerman, G-E commercial engineer, registers happiness.

F. J. Byrne of Newark and Johns-Manville, phones for some supplies so that the party can start.

Official bartender to the group is R. M. Hyde of McCord Radiator & Mfg. Co. Mr. Hyde was, as you can guess, a popular man.

George Bruce Palmer of McCord brings up replenishments to his co-worker, Mr. Hyde.

"Hail! Hail! The gang's all here." A final highball before the banquet is enjoyed by a congenial group.

"After the Ball Is Over"—M. R. Carr, Johns-Manville representative from Baltimore.

A. A. Pfeiffer of Asbestos Construction Co., discovers what it costs to go to an A.S.R.E. party.

Next morning, bright and early, George Bright and R. J. Quinn (Mathieson Alkali) are downstairs for the sessions.

It's Coming!

The 20th Anniversary KELVINATOR!

NEXT month the BIG NEWS will be out—and what good news it is going to be for the hundreds of thousands of women who are planning on buying an electric refrigerator in 1934. And by the same token, what good news it is going to be for the dealers and salesmen who sell Kelvinator!

The 20th Anniversary Kelvinator—the refrigerator with a place for everything—the refrigerator which has more outstanding and exclusive features than any other electric refrigerator on the market.

The BIG NEWS will be out next month, and 1934 is *bound to be* another KELVINATOR YEAR! . . . KELVINATOR CORPORATION, *14250 Plymouth Road, Detroit, Mich. Factories also in London, Ontario, and London, England.*

(773)

HOME SERVICE

By Jean M. Kerr

Salad Solon

When we walked into the weekly cooking school held in the General Electric Dream Kitchen on the tenth floor of the J. L. Hudson Co. department store here last week, we were expecting to hear something about Christmas salads.

Our disappointment was keen at first when we glanced over the menus listed for the day. Salads were there in plenty, but Christmas was noticeably absent.

However, we hadn't been listening to Mrs. MARION GEORGE, home economist from the Wesson Oil Co., very long before we realized that we were hearing a lecture by someone who knew all about salads, inside and out, and could tell others about them. She conducted one of the most interesting and attention-holding demonstrations we've heard.

Having lived in France for a number of years, Mrs. George has the Gallic attitude toward salads—they should be not only things of beauty, but things with a definitely sparkling taste.

"My experience in France has convinced me," she said, "that we home economists and dieticians have almost ruined the fine art of cooking here in America. We have thought so much about health and proper combinations that we have almost lost the art of flavor.

"Another noticeable and regrettable American fault is haste in eating. The old world is more leisurely, enjoys its food."

Before starting her demonstration proper, Mrs. George discussed the different kinds of salad—the luncheon salad and dinner salad (both small) and the party salad which, being a main dish, is somewhat larger.

"Salads have no place in the afternoon tea," she maintained. "Sandwiches, cakes, and tea are sufficient for this late-afternoon meal."

Another criticism she made was that people have not been educated to the point where they eat all of the salad—lettuce, parsley, and everything.

"A French chef would be horrified if you left these things on the plate," she pointed out. "When a meal is set before you in France, everything has been put there to be eaten. Another insulting gesture is to salt the meal before tasting it. Cooks have been known to leave because a guest gave this evidence that the meal had not been properly seasoned and flavored."

* * *

Wood, Crockery, China

Wooden salad bowls are still the best after years of use, Mrs. George believes.

"Your wooden bowl should never be washed," she explained. "Clean it only with salt."

Another use for wood is in the French dressing bowl which is so much used in foreign countries. These bowls are made from fruit tree wood. With this equipment, one uses wooden fork and spoon in serving.

Interesting china and crockery dishes may also be used for salad, accompanied with composition forks and spoons. About the only material which should never be used in salad making and serving is silver.

* * *

Dressing the Salad

First two demonstrations on the program were concerned with the making of French dressing and mayonnaise, both prepared in the Wesson Oil Co.'s glass utensil. This dressing mixer is a tall glass jar with a tight-fitting cover through which a dasher is manipulated. Recipes for the two dressings are on the side of the jar.

In making French dressing, Mrs. George pointed out, lemon juice is better than vinegar. To make the American brand of French dressing it is necessary to add paprika for coloring. Otherwise, the recipe calls simply for oil, lemon juice, salt, and sugar.

Variations of the two standard dressings include Chantilly (whipped cream and mayonnaise), bar-le-duc (tart jelly and French dressing), thousand island (chopped relish, chili sauce, cheese, egg, beet, and mayonnaise), lancashire (pearl onions and French dressing), and many others.

All chicken, meat, and vegetable salads should be marinated, or mixed with a tablespoon of French dressing and allowed to stand in a cool place for a while before serving. This brings out the flavor of the ingredients, according to Mrs. George.

* * *

Unusual Combinations

One of the out-of-the-ordinary salads Mrs. George prepared for her listeners was a macaroni salad.

Boiled macaroni is combined with chopped green pepper, grated cheese, diced celery or celery cabbage, and chopped parsley. After being marinated, the mixture is blended with mayonnaise, placed attractively in a lettuce-lined bowl, and garnished with sliced sweet pickles.

"The nice thing about making salads," stated Mrs. George, "is that you don't have to use any definite amounts. You just put together what you have, and there you have it. Providing, of course, you combine unusual things gracefully."

Unusual and attractive was the lecturer's Bing-Coke salad. This can be made in a ring mold, or in individual orange-skin cups. Cherry jello is softened in one cup of warm water, and a cup of Coca-Cola is added. After the mixture has started to harden, large purple (or Bing) cherries are pressed into it, together with pineapple chunks and pecans.

Result is an interesting dark-red salad which should be served with Chantilly dressing on crisp lettuce leaves.

* * *

Dream Kitchen

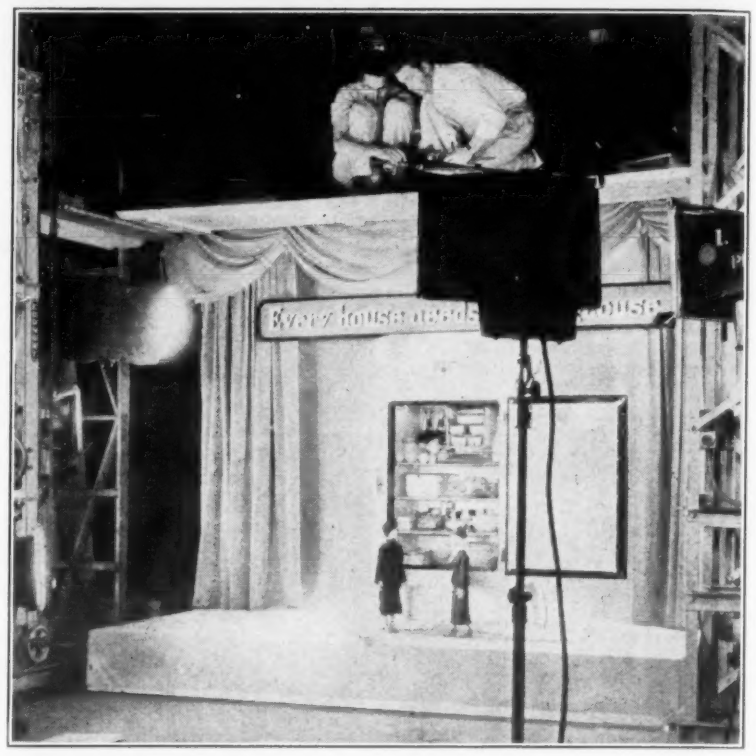
Weekly classes in the department store's General Electric Dream Kitchen are conducted under the direction of JESSICA MEEK, formerly with Detroit Edison Co. here.

Every Wednesday and Thursday, an outside lecturer presents cooking demonstrations; and once a month at an informal tea the women are given a chance to inspect the all-electric kitchen.

One recent lecture of interest was given by Mrs. HELEN MURRAY from the General Electric Kitchen Institute in Cleveland, who spoke on the merits of the all-electric kitchen. (See July 26 issue of ELECTRIC REFRIGERATION NEWS for an outline of this demonstration.)

Over 1,000 women heard Mrs. Murray in the two-day school.

Pulling Strings



Ted Mabley and William Duncan of Duncan & Mabley, Cleveland, designers of theater and stage props, concentrate on manipulating marionettes used in filming a movie for the Kroger-Westinghouse cooking school.

CLARA DEAN VISITS G-E DEALERS IN NEW ENGLAND

CLEVELAND — Demonstrating the all-electric kitchen and cooking with an electric range, Clara Dean of the General Electric Kitchen Institute here has been contacting New England women through dealers and distributors in that area.

Two meetings were held in Lewiston, Me., and in Springfield, Mass. Following this, Miss Dean gave a two-day demonstration of the all-electric kitchen under the auspices of Philip H. Harrison Co. at Hackensack, N. J.

In Providence, R. I., she conducted a department store demonstration, and in Baltimore she held a cooking class for the Hines Co. salesmen.

All-Electric Kitchen Featured on Radio

ATLANTA—On the air three times a week from the home service kitchen auditorium in the Electric building here, Miss Fern Snyder, home service director for Georgia Power Co., is conducting the station WSB Radio Kitchen.

Miss Snyder talks about the modern kitchen, gives recipes and menus, and supplies suggestions on managing the homemaker's tasks. Listeners are urged to write to the Radio Kitchen for information on kitchen operation.

Sponsoring the program are Rumford Baking Powder, White Lily Flour, Snowdrift, Wesson Oil, Cudahy Packing Co., Rogers' Breads and Coffees, Thomas' Delicious Sauce, Georgia Power Co., Pedigree Milks, Morton's Salt, and Kelvinator Sales Corp.

112,000 WOMEN ATTEND KROGER & WESTINGHOUSE COOKING SCHOOL CLASSES

MANSFIELD, Ohio — More than 112,000 women attended the first 36 classes of the Kroger-Westinghouse cooking school, now in its fourteenth week, and over 7,000 people have been turned away from the crowded halls.

The attendance thus far at the 1933 sessions of the cooking school represents a 50 per cent increase over last year when the total attendance for 96 classes reached 215,000.

During the first 12 weeks of the school's 1933 tour, Kansas City, Mo., set a record for attendance with over 19,000 women present for the three classes. Madison, Wis., had the lowest attendance with 4,100, although more than 2,000 were turned away.

Tangible evidence of the school's success is found in resultant appliance sales. In the period of five weeks following the closing of the show in the six cities already checked, traceable results indicate that 98 refrigerators have been sold by local Westinghouse dealers. In addition, over 50 Westinghouse ranges, as well as a number of mixers, coffee makers, toasters, automatic irons, and other electrical home appliances have been sold.

Adding novelty to the program of the three-day school are a group of motion pictures based on familiar family situations, slides which accompany and clarify the lecture demonstrations, and a movie using marionettes. (For a complete description, see the Nov. 1 issue of ELECTRIC REFRIGERATION NEWS.)

SALES OF APPLIANCES BETTERS HOME STANDARD

MANSFIELD, Ohio — An unusual angle of refrigerator selling was presented by Grace Larabee, home service director with Louisiana Power & Light Co., on her recent visit to the Westinghouse home economics laboratory here.

"Many small homes in Louisiana," reported Miss Larabee, "are little more than shacks. There are many rice farmers down there who have made money but have put very little of it into comfortable homes. When an electric range or refrigerator is sold to them, they find that the whole standard of living seems to improve."

The beauty of the equipment they have purchased, according to Miss Larabee, stimulates interest in rebuilding their kitchens to suit the appliances.

The Southern home economist came to Mansfield to receive information on the new dual-automatic ranges. Previously she has done lecture and demonstration work on Westinghouse refrigerators.

Bridge Luncheons Bring Kelvinator Sales

BUFFALO—Norma Niehoff, home economist with the Kelvinator branch here, has been concentrating her attention on the bridge luncheons she has been holding for club and church groups this fall.

At a recent bridge party for four tables she developed eight prospects, and sold one Kelvinator at the luncheon.

TASTE OF THE BEER ...AND LIFE OF THE COILS...

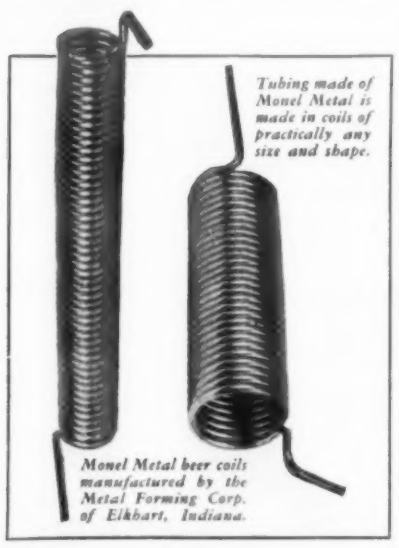
Monel Metal beer coil manufactured by Metal Forming Corp. of Elkhart, Indiana.

...both depend on the Same Thing!

IN beer cooling installations, there must be no corrosive reaction between beer and metal.

That would have a destructive effect on the coils and on the taste of the beer.

The coils shown here meet this vital requirement because they're made of Monel Metal...absolutely rust-proof, stubbornly resistant to corrosion and easy to clean.



Tubing made of Monel Metal is made in coils of practically any size and shape.

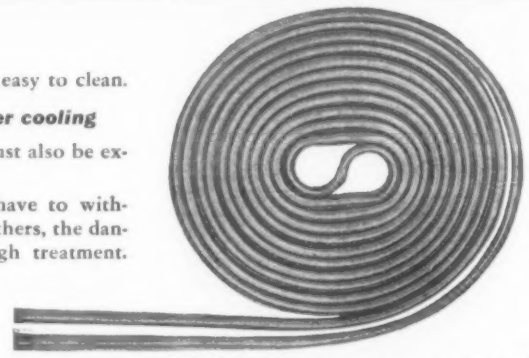
Monel Metal beer coils manufactured by the Metal Forming Corp. of Elkhart, Indiana.

More strength...better cooling

Beer cooling equipment must also be extremely strong.

For some installations have to withstand the impact of ice...others, the danger of kinking from rough treatment. Many must meet both these conditions.

Moreover, Monel Metal's great strength permits thin coil walls and, consequently, rapid and efficient cooling action.



Monel Metal pancake type coil manufactured by the Metal Forming Corporation of Elkhart, Indiana.

It costs the same

Yet, despite these unmatchable advantages, the cost of Monel Metal is practically the same as other materials commonly used for beer coils.

Furthermore, beer handling equipment with Monel Metal parts has behind it an extra sales impetus.

For Monel Metal's virtues are being unceasingly impressed on both general public and trade by powerful and continuous advertising in the great national magazines as well as the leading organs of the food service business.

Let us send you complete information and prices of Monel Metal for use in beer cooling and other refrigerating equipment...just drop us a line today.

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET, NEW YORK, N. Y.

MONEL METAL

Monel Metal is a registered trade-mark applied to an alloy containing approximately two-thirds Nickel and one-third copper. Monel Metal is mined, smelted, refined, rolled and marketed solely by International Nickel.

MAJESTIC

THE PACE-MAKER

During 1933 Majestic "Smart Set" radios have set the *style-pace*, enabling dealers to cash in on the new and insistent demand for modern styling in all home furnishings.

During 1933 Majestic has set the pace in *radio engineering* —with far-reaching chassis improvements; with the development of Majestic Duo-Valve (2-in-1) Self-Shielded tubes.

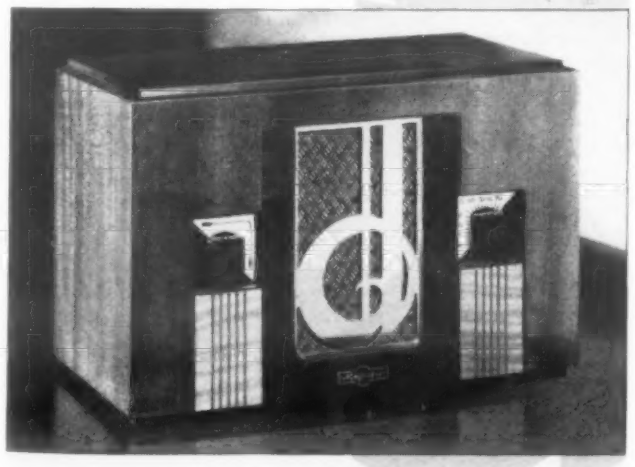
During 1933 Majestic has set the pace in auto radio design and construction; and in farm radio. Majestic aggressiveness and progressiveness have put new life in the industry. . . .

***For 1934* Majestic promises to *hold* the pace of leadership— in engineering, in design, and in forward-looking sales policies that will continue to give Majestic dealers an advantage over all competition.**

For 1934, in refrigeration, Majestic is now ready to announce new models that are revolutionary in beauty and efficiency—as outstanding as Majestic's recent contributions to radio styling.

In 1934 Majestic dealers are going to find their sales and profits *stepped up* by the sure, swift pace that has carried Majestic to the forefront of the industry.

MAJESTIC . . . 5801 Dickens Avenue, Chicago



A MAJESTIC pace-maker! A new *de luxe* AC-DC model, the *Mayfair,* in a sumptuous mahogany cabinet. Full 8-tube performance; has automatic volume control; illuminated dials; self-contained aerial. The finest AC-DC set ever produced.

Majestic

RADIO . . . . REFRIGERATION

CHICAGO WESTINGHOUSE SALESMEN WIN TURKEYS

CHICAGO—By topping their quotas in a pre-Thanksgiving sales contest, 38 refrigerator salesmen of Westinghouse Electric Supply Co. here won free gobblers for Thanksgiving dinner, according to an announcement made by Sales Promotion Manager Hortense Ratcliffe, who conducted the contest.

Following are the men who won 15-lb. birds: C. A. Crawford, Ray Kranz, E. E. Clark (these three men won two turkeys each by doubling their quotas), G. S. Crawford, R. B. Ford, Sig Lienthal, W. C. DeCrane, K. S. Crighton (supervisor), and O. R. Squires.

Ten-lb. gobblers were awarded to: C. F. Brown, R. P. Maveety, C. W. Govas, A. G. Paine, N. A. Hjelte (supervisor), C. A. Jobst, J. C. Peterson (supervisor), C. E. Nelson (supervisor), A. A. Gray, C. C. Lindstrom, C. Schatz, L. Mainwaring, L. Blackburn, M. A. Noel, C. B. Sturgeon.

W. H. Ditto, A. D. Louden, L. Worthington, C. Kraft, R. Swett, William Kotel, A. E. Kerstetter, D. Nordenmalm, J. O. Gentry, George Enders, John Mosberg, John Hager, E. Sturtevant, and E. L. Portman.

SERVEL UNITS PROTECT SERUMS IN SOUTH AFRICA

JOHANNESBURG, South Africa—Protection for serums valued at $250,000 in serum cabinets of the South African Medical Research Co. is provided by Servel commercial refrigeration equipment recently installed by Hubert S. Davies & Co., Ltd., Servel distributor for South Africa.

Equipment consists of four 100-A Servel condensing units to refrigerate the large cabinets, with another 100-A unit to cool a low-temperature tank used for testing serums.

The Surprises of 1934

HOW DID YOU HAPPEN TO GET IN TOUCH ,,, WITH US?
YOU CAN THANK YOUR ADVERTISEMENT IN THE 1934 REFRIGERATION DIRECTORY FOR THIS ORDER ,,,
1934 ★ REFRIGERATION DIRECTORY

Perhaps you know where most of your 1934 business is coming from.

But 1934 will undoubtedly produce many surprises.

More new firms are now planning to enter the electric refrigeration field.

A lot of new people will be in the business.

Some you may know—many you don't.

But your advertisement in the 1934 Refrigeration Directory and Market Data Book will reach both your known and unknown customers.

The cost is so little that you simply cannot afford to take the chance of missing a good order.

If you have products or services to sell to refrigeration manufacturers, distributors or dealers, give the information in your Directory advertisement where your customers and prospects may find it when they are in the market.

Forms close February 1, 1934.

Features of the 1934 Directory

Specifications of all models and all makes of household and commercial refrigerating units.

Statistics — Facts and figures on past sales and methods of distribution.

Classified listing of refrigeration equipment, parts and supplies with names of all manufacturers.

Trade Names of refrigeration products alphabetically listed.

Geographical listing of all manufacturers.

Alphabetic listing of all manufacturers.

BUSINESS NEWS PUBLISHING CO.
550 Maccabees Bldg., Detroit, Mich.

Michel and North Win McGraw Awards

NEW YORK CITY—Charles E. Michel, sales manager of the Union Electric Light & Power Co., St. Louis, and Jack E. North, president of the Electrical League of Cleveland, have been selected by judges to receive the James H. McGraw Medal for Cooperation in 1933, according to Earl Whitehorne, secretary of the McGraw awards committee.

It is customary to award only one medal for cooperation each year, this being the first time that a double award has been made. Mr. Michel received his medal at a dinner meeting in St. Louis Dec. 7, while Mr. North is to receive his award at a banquet tonight (Dec. 13).

On Dec. 8, the James H. McGraw Contractor-Dealers Medal for 1933 was awarded to Gerry M. Sanborn, president of the Sanborn Electric Co., Indianapolis.

WESTINGHOUSE OUTLINES SALES PROMOTION PLANS

PITTSBURGH—How Westinghouse refrigerator sales are being promoted in western Pennsylvania during December was outlined for 265 dealers, salesmen, and central station men at a meeting sponsored here Dec. 4 by the Danforth Co. and Iron City Electric Co., Westinghouse distributors, and Westinghouse Electric & Mfg. Co.

Meeting was held at the Better Homes and Building Exhibit in Pittsburgh's Gulf building, where six model homes—all with completely electrified kitchens—are displayed to the public.

The session was opened by J. E. Hugo, central district sales promotion manager of Westinghouse Electric & Mfg. Co., while in charge was P. Y. Danley, recently appointed assistant sales manager of the company's merchandising department at Mansfield, Ohio.

H. B. Donley, Westinghouse appliance sales manager; L. L. Shawber, manager of vacuum cleaner and laundry equipment sales; S. M. Davison, refrigeration division, Mansfield, Ohio; C. J. Campbell of the Westinghouse Lamp Co.; and J. F. O'Donell, central district merchandise manager, were speakers at the meeting.

According to Mr. Hugo, the Danforth company is using 110 billboard posters in Alleghany county to advertise Westinghouse refrigerators in that area during the Christmas season.

SERVEL SYSTEM RECLAIMS CARBON TETRACHLORIDE

CHICAGO—Method of reclaiming highly volatile carbon tetrachloride used in cleaning clothes has been developed by the New Process Cleaners, 2608 Milwaukee Ave. here, Servel refrigeration equipment being used in the process.

According to owners of the concern, carbon tetrachloride is the best cleaning agent available for their process. Because of its highly volatile properties, however, much of the expensive liquid was wasted until present reclamation methods were devised.

Using a Servel 150-AW machine with three radial fin coils and expansion valves, the substance is reclaimed and converted back into liquid form by passing the fumes over the cold coils, where they condense and then run into a tank for distillation. After distillation, the carbon tetrachloride is again ready for use.

FILTRINE WATER COOLERS PLACED IN STEEL PLANT

WHEELING, W. Va.—Five Filtrine commercial water coolers with General Electric condensing units have just been installed in quarters of the Weirton Steel Corp., Weirton, W. Va., by the W. N. Hogan Co., G-E distributor here.

Following is the equipment installed: two MA-40-R water coolers refrigerated with a CM-6-W General Electric unit, two M-14-R coolers with CM-6-W G-E condensing units, and one M-25-R Filtrine cooler with a CM-6-W G-E unit.

Same distributor recently installed a Filtrine M-75-R water cooler with a General Electric CM-8 compressor in the plant of the Wheeling Steel Corp. at Steubenville, Ohio.

BUSH OPENS ASSEMBLY PLANT IN CHICAGO

CHICAGO—Bush Mfg. Co., with headquarters in Hartford, Conn., has opened an assembly plant at 610 N. Oakley Blvd. here to fabricate evaporators, according to C. A. Olson, the company's western manager.

FOURTH KELVINATOR CONFERENCE IS HELD

DETROIT—Fourth of Kelvinator Corp.'s annual series of meetings for distributors is being held in Detroit this week. As in previous years, the company's new sales plans are being presented to small groups of distributors, rather than to one large gathering.

Following are the delegates attending this week's meeting:

Roy Steuber and Paul Sowell, 555, Inc., Little Rock; R. A. Riley, Graybar Electric Co., Dallas; R. L. Simpson, C. T. Patterson Co., New Orleans; David Steves, Steves Sash & Door Co., San Antonio; D. H. Straus and J. A. Bertha, Straus-Rodenheimer Co., Houston; R. Querbes and J. A. Lee, Interstate Electric Co., Shreveport, La.

Ted Wilson, Southwestern Gas & Electric Co., Shreveport, La.; Jack Justice, Kelvinator-Appliance Corp., Miami, Fla.; G. Marchmont and A. D. Hammond, Graybar Electric Co., Atlanta; H. F. Bethea, Graybar Electric Co., Jacksonville, Fla.; J. Mathews, Mathews Refrigeration Co., Montgomery, Ala.

New Haven Delegation

R. P. McDavid, Clark & Jones, Birmingham, Ala.; F. O. Rackliffe, Mr. Webber, Mr. Hagle, Miss Barnes, Rackliffe Brothers, New Britain, Conn.; R. W. Lynch, Post & Lester, Providence, R. I.; S. Roskin (Middleton, N. Y.), M. Roskin, Messrs. Isaacs and Abramson (New Haven), and Mr. Host, Roskin Brothers, New Haven, Conn.

H. A. Thompson, G. S. Blodgett Co., Burlington, Vt.; Harry Troutwine, Kelvinator Sales Corp., Cambridge, Mass.; S. D. Fitzsimmons, Narragansett Electric Co., Providence, R. I.; A. H. Allcott, Central Vermont Public Service Co., Rutland, Vt.; Mr. Schroeder, Texas-Louisiana Power Co., Fort Worth, Tex.

Texas Distributor

T. O. Bannahan, Houston Power & Light Co., Houston, Tex.; L. R. Parker, Commonwealth & Southern Co., New York City; C. Collier, W. W. Barr, and O. M. Jackson, Georgia Power Co., Atlanta; J. S. Sutherland and Mr. Lester, Alabama Power Co., Birmingham, Ala.; F. M. Turner, Mississippi Power Co., Gulfport, Miss.

E. Ensor, Gulf Power Co., Pensasola, Fla.; G. E. Fuller, Worcester Electric Light Co., Worcester, Mass.; Harry Smith, Brockton Edison Co., Brockton, Mass.; Dick Lincoln, Boston Edison Co., Boston; Archie Williams, Electric Light & Power Co., North Abington, Mass.

D. M. DeBard, Stone & Webster Co., New York City; J. H. Hopley, New Hampshire Gas & Electric Co., Portsmouth, N. H.; G. S. Harding, New Hampshire Co., Newport, N. H.; R. E. Holden, Cumberland County Power & Light Co, Portland, Me.; R. C. Harvey, Public Service Co. of New Hampshire, Manchester, N. H.; R. M. Haskell, Bangor Hydro-Electric Co., Bangor, Me.

OFFICIAL WELCOME HELD IN BOSTON FOR PARKER

(Concluded from Page 1, Column 2)

held in the fashionable Copley Plaza hotel and was broadcast over the New England NBC network.

City officials and nearly half a hundred leading citizens attended the luncheon and reception that followed and witnessed presentation of a silver key to the city to Mr. Lord by Mayor Curley.

Frigidaire dealers throughout Massachusetts, the Jordan Marsh Co., department store dealership, and the Edison shops of Boston had distributed 105,000 tickets of admission to the boat up until Friday noon.

On Sunday, 20,403 visitors passed through the boat, sending to 35,900 the number of persons visiting the boat in two days.

Police Superintendent Martin King on Saturday ordered 50 policemen to handle crowds at T wharf, and members of the mounted squad to duty on approaching streets to direct traffic.

On Monday, Mr. Pfeil gave a luncheon on board the schooner at which Governor Ely expressed the welcome of the Commonwealth of Massachusetts.

The broadcast yesterday (Dec. 12) was made from Boston Harbor and had to do with the strange cruise of Dinty McGuire, famous waterfront character who sailed a five-master to sea and back again single-handed.

F. B. RILEY DISCONTINUES RANCO CONTROLS

DETROIT—Frank B. Riley, for several years representative of the Automatic Reclosing Circuit Breaker Co., maker of Ranco controls, will no longer be connected with that company after Jan. 1. After that date he will devote his entire time to products of Riley Engineering Corp. of which he is president.

SERVICE NOTES

By K. M. Newcum

Moisture in the SO-2 System

EXTREME care has been administered all down the line from the manufacturer to the service man to eliminate moisture from the refrigeration system. The manufacturer thoroughly dehydrates the system and its component parts by subjecting them to a temperature of around 180 to 200° F. for from 10 to 24 hours while under the highest possible vacuum.

Dry refrigerant and oil is then charged into the system to displace the vacuum after the dehydrating process is completed. This method results in a perfectly dry system, void of moisture, air, and other foreign substances.

Dehydrated Tubing

The tubing, evaporators, fittings, etc., are also thoroughly dehydrated by a similar process, and sealed immediately thereafter. The installation man must exercise care at all points of installation, for he is entrusted with equipment that was carefully dehydrated and sealed at the factory.

Any carelessness on his part from the standpoint of admitting moisture or air to the system or any parts thereof, will result in an undue amount of service trouble.

Moisture has different reactions on different systems using the various refrigerants. SO_2 while in a dry state will have no effect upon any metal used in the refrigeration system. If moisture is admitted it will unite with the SO_2, forming sulphurous acid.

Sulphurous acid may be termed as sulphuric acid's little brother, and has a similar chemical reaction, in a less effective manner. Sulphurous acid will attack iron or iron ores, tending to eat the surface resulting in pitted or uneven surfaces of the iron or steel parts such as valves, pistons, rings, cylinders, etc.

Freezes Valves

It will not have any noticeable effect upon the copper or copper parts, but will effect the solder joints. If a sufficient moisture is admitted to the system, the sulphurous acid solution becomes so strong that it tends to freeze or stick the valve and compressor parts together, resulting in what is known as a stuck-up job.

A system having a slight amount of moisture may operate without any noticeable effect from sticking or squeaking, but the sulphurous acid is doing its destructive job in a smaller manner. The first indication of moisture in the SO_2 system is leakly valves, such as the discharge valve.

This may be noticed while the cylinder head is removed, for if there is any appreciable amount of moisture present, a black pasty substance will be observed on the polished surfaces of the valves, as well as on the castings themselves.

Often a carbon deposit is found, similar in appearance to that of cylinder head of the automobile engine. The carbon is a result of moisture plus SO_2 plus high operating head pressures, for the heat at the head has caused the black pasty substance to form carbon.

Excessive Carbon Deposits

While in contact with the cylinder head and the discharge valve parts, this carbon does not effect the operating of the system, in a similar manner to that of the automobile engine. If, however, the carbon deposit becomes excessive, certain particles of carbon will break loose, and be carried with the refrigerant and oil into the system.

The larger particles of carbon will be trapped in the strainers, while the more minute particles find their way through the strainers along with the refrigerant and oil through the entire system.

Needless to say carbon is hard and has sharp cutting surfaces. The small particles will, if given sufficient time, cut the needle and seat of the refrigerant control, causing excessive wear at that point, as well as have a similar effect upon the cylinder walls, pistons, piston valves, discharge valve, and all other friction or wearing surfaces of the system.

Closes Strainer Surfaces

The larger particles collecting in the strainers result in restricted, or completely clogged strainer surfaces. Often these strainers are located inside the float chamber, receiver, or expansion valve and considerable time is involved in cleaning or replacing them.

Many short cuts have been tried in the field in an attempt to rid the SO_2 system of moisture and carbon. No field method however is completely satisfactory because the whole system, condensing unit, evaporator, connecting tubing, valves, fittings, etc., must be completely discharged, cleaned, and dehydrated, before a new charge of dry refrigerant and oil will be effective.

This is a shop job. The modern shop is equipped with similar facilities, to that of the factory for discharging, cleaning, repairing, dehydrating, and re-charging the system for re-installation.

In most cases it is difficult to convince the customer that he will save money by having his job completely overhauled to remove the cause of the clogging strainers, worn valves, parts, etc., but both the customer and service man will benefit by having it done correctly, rather than slip-shod.

If it is necessary to keep the job running until colder weather, which is often the case, the inside strainers may be removed, and an efficient line strainer placed in the liquid line near the liquid line shut-off valve on the receiver.

A suitable line shut-off valve should be placed between the strainer and the evaporator to facilitate removal of the outside strainer, for cleaning or replacing.

The system should be purged thoroughly of all air. Every possible leak on the low side of the system must be checked thoroughly, for in a great number of cases the moisture entered the system along with air that was drawn in through a leak in the low side of the system, during operation below zero pounds gauge pressure.

Since carbon is formed in the cylinder head of the compressor, anything that can be done to reduce the temperature of the head will in turn reduce the possibility of the formation of carbon.

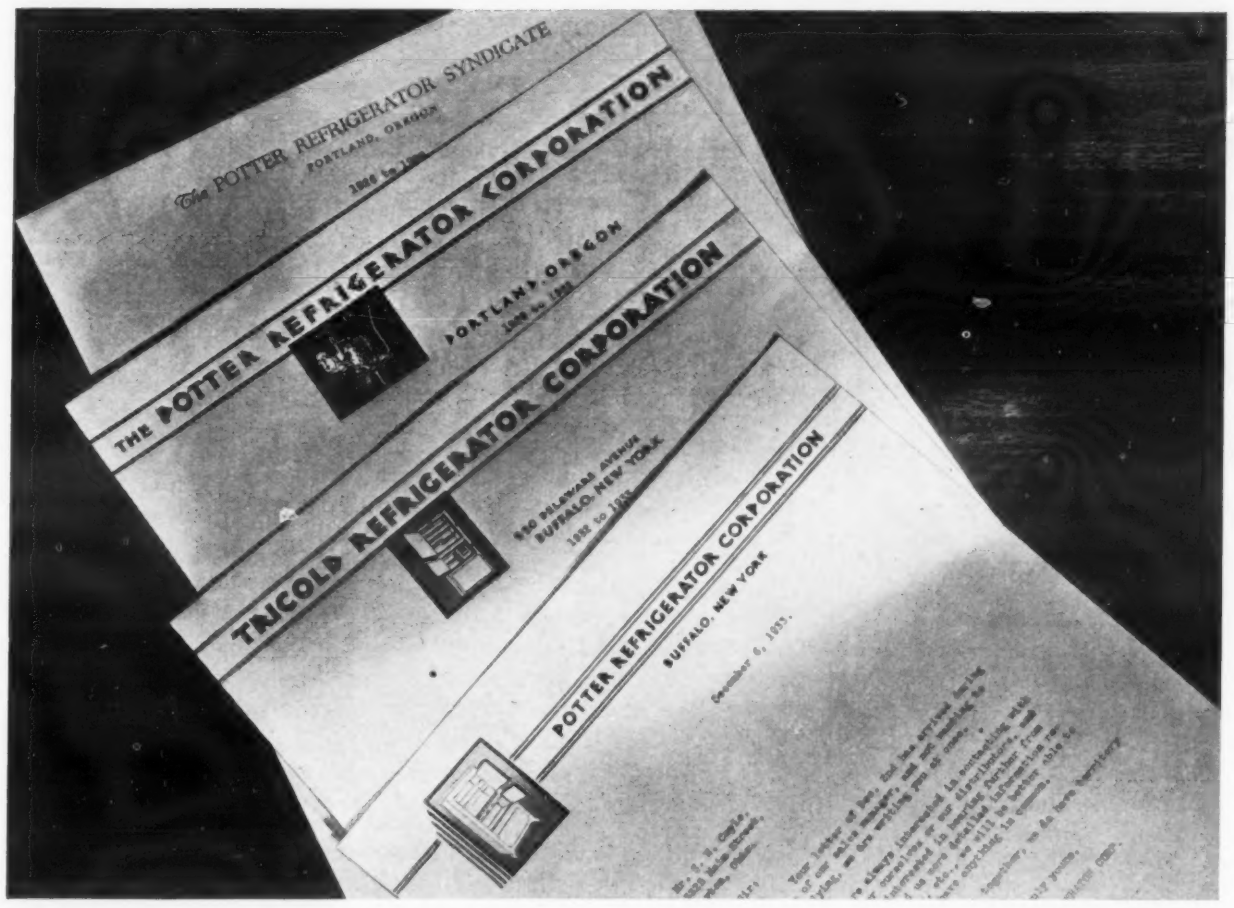
Water-cooled and refrigerant-cooled heads have given considerable assistance toward the reduction of carbon, and its attendant evils. They do not prevent air and moisture from entering the system any more than any other type head, however—that is up to the installation and service men.

McGUFFEY NAMED CHIEF ENGINEER OF KOLD-HOLD

LANSING, Mich.—O. S. McGuffey has been appointed chief engineer of the Kold-Hold Mfg. Co. here, according to W. G. Farnsworth, general manager. Mr. McGuffey joined Kold-Hold in November of 1932, as superintendent.

Previous to his association with Kold-Hold, he worked on truck refrigeration with Kelvinator Corp., and for seven years was chief engineer of Superior Body Corp. of Lima, Ohio.

To Correct an Error . .



EACH LETTERHEAD A MILESTONE in POTTER *Progress*

It has been said, "To err is human". It has also been said, "An uncorrected error is a bar to progress".

A short time ago it was called to our attention that there are only six recognized electric refrigerators now on the market whose history dates as far back as 1926. *The Potter Refrigerator is one of these six.*

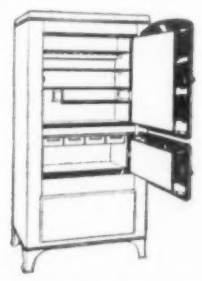
With the recognition of this fact came the full realization that by a single mistake . . . the change of our trade name in 1932 from "Potter" to "Tricold", we had unwittingly sacrificed that most valuable business asset—the public consciousness of the unbroken continuity of tradition and progress which lies behind our product.

In February 1932 we introduced our new model of that year and called it "Tricold". Thinking to avoid possible confusion we adapted that name to our corporation. This change of name was a mistake. We realized this to a degree last year and as a consequence, this year, 1933, saw our product again under the name "Potter Refrigerator", the name of its birth, a name rich in tradition, one filled with the romance of the early days of the refrigerator industry.

And now to completely remove the last vestige of this error, we are restoring to our company its rightful name—Potter Refrigerator Corporation, the name under which our product attained its first commercial success.

We apologize to our friends in the trade for any temporary confusion which may result, but believe they will be glad to see us once again under the old banner.

President



POTTER REFRIGERATOR CORPORATION
(Formerly Tricold Refrigerator Corp.)
BUFFALO, N. Y.

POTTER

Our company is introducing for the year 1934 eight new models genuinely competitive in price with the recognized leaders in the trade, with quality strictly up to the highest Potter traditions, all embodying Potter Air-Conditioning and other features which place the Potter Refrigerator in a merchandising class by itself, literally beyond competition. Write for our booklet "Let Potter Owners Tell You".

REFRIGERATORS

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EDITORIAL AIMS

To encourage the development of the art.
To promote ethical practices in the business.
To foster friendly relations throughout the industry.
To provide a clearing house for new methods and ideas.
To broadcast the technical, commercial, and personal news of the field.

VOL. 10, NO. 15, SERIAL NO. 247, DEC. 13, 1933

Engineers Progress on Air Conditioning

FAIR WEATHER is not always experienced when goodfellows get together—particularly when the goodfellows happen to be engineers. Not that engineers can't get along together; on the contrary, relations between engineers of competitive concerns are often more amicable than relations between rival sales executives. But engineers, being pioneers, are individualists; and their respective ideas don't always "gee."

Hence it's not news when we say that engineers who gathered in New York City for the midwinter meeting of the American Society of Refrigerating Engineers debated from breakfast coffee to post-midnight highball. The fact that their wrangles centered almost entirely around air conditioning is, however, a newsworthy fact. This has been more or less true of previous meetings in the last couple of years, but never to the extent noted this year.

Chief Topic of Research and Discussion

All of which indicates that the subject of air conditioning is uppermost these days in the minds of refrigeration engineers (and, likewise, in the minds of the heads of their respective companies; for it is the presidents and boards of directors who set the compass for the research activities of their engineers).

Signs of health and growth are apparent, too. Sensible suggestions like the use of cooling towers in cities where a limited water supply handicaps the liberal extension of air-conditioning projects, studies in the hitherto neglected field of higher temperature refrigeration (sounds like a paradox, but isn't—evaporator temperatures specified for air-conditioning systems are considerably higher than those required for food storage), practical attacks on the problems of conditioning the air in vehicles of transport—all these and more came out in the discussions at the A.S.R.E. meeting last week in New York City.

Getting Down to Cases

Discussions which hitherto have been, for the most part, theoretical, were this year turned toward more pragmatic dilemmas, toward making air conditioning commercially feasible on a large scale. Refrigeration engineers apparently have now come to close grips with reality in the field of air conditioning, and the ideas and designs they are promulgating have the feel and appearance of practicality, rather than "such stuff as dreams are made on."

In contrast, the merchandising picture daily seems to become more involved. As is right and proper, the engineers seem to have advanced considerably beyond the sales departments in ironing out the wrinkles and cutting the Gordian knots which seem to be invariably the lot of a brand new industry. Promotion of "air conditioning," or what passes for it, is running in many and varied directions (see editorial in Nov. 22 issue) and, some of the more conservative elements in the industry think, is running a bit wild.

Heating vs. Cooling Industries

Principal line of cleavage is between the heating and cooling guilds. Heating and ventilating men are inclined to be somewhat bitter about the place refrigeration has achieved in the air-conditioning sun. They claim that refrigeration manufacturers have, by their advertising, led the public to believe that air conditioning is primarily cooling; whereas in reality it consists of ventilation all the time, heating most of the time, and refrigeration part of the time. They claim priority, too, in engineering for human comfort.

On the other hand, they themselves admit that their long-established retail outlets—the plumbing and heating contractors—have never learned how to sell, and that any new product of such high initial cost generally needs the impetus of specialty selling methods.

No matter what engineering principles are ultimately proven right in the construction of air-conditioning equipment, and no matter who will eventually assume the burden of selling it, it does seem certain that air conditioning is progressing rapidly and surely toward its goal of becoming a major industry, and that it seems likely to gain more momentum in 1934 than it has in any previous year. At least, leading executives of the industry have it figured out that way.

Impetus from Outside Sources

Many things have occurred in recent months to further the interests of air conditioning, and to smooth the path of those who would sell equipment now available. Housing projects, government buildings, new public works are opening sizeable markets for companies which can supply complete systems of large capacity.

Another development which looks promising is the redesigning of railroad trains, a development that at last seems to be assured. Streamlined, high-speed aluminum cars, faster locomotives, more comfortable accommodations—all these things and more are being demanded by a public which is looking with increasing favor upon airplane and bus travel. Meet this competition the railroads must, and meet it they will with new and modern equipment.

Railroad Market Seems Promising

The cost of air conditioning a new railroad coach or Pullman is much less than that of revamping an old car to accommodate air-conditioning equipment. Moreover, the tough problem of strain on the coupling caused by the increased and unprovided-for load factor of the heavy air-conditioning machinery ceases to be a problem when the car is originally designed for the equipment. Public acceptance of air-conditioned railroad cars has already been proved almost beyond question (ask President Daniel Willard of the B. & O., if you won't take our word for it). Everything thus seems to be working toward the end of vastly increased use of air conditioning in the transportation field.

These are but examples. Demand is growing, engineering is progressing. Good management—especially with regard to sound merchandising thinking, effective promotional methods, and thoroughgoing education of both public and the trade concerning what air conditioning is and what comprises satisfactory equipment—should provide the missing link which will chain demand and inventive genius to the wheels of profitable business.

2,000 to Cooperate In Christmas Campaign

DENVER—A Christmas merchandising campaign, in which approximately 2,000 men and women will take part, will be carried on in Colorado, New Mexico, and Wyoming under the direction of the Rocky Mountain Electrical Association.

The Christmas activity is the first phase of the association's appliance sales campaign which is scheduled for a period of two years. "Give Something Electrical" will be the slogan of the Christmas campaign.

Under the novel plan that has been evolved for carrying on the activity, every employe and every official of the companies and firms involved will be assigned a part in carrying out the program.

The campaign is under the direction of G. B. Buck, president-elect of the Rocky Mountain Electrical Association. Assisting him will be the state chairmen which include Wyoming—W. D. Johnston, Mountain States Power Co., Casper; Colorado—Clare N. Stannard, Public Service Co. of Colorado, Denver; New Mexico—Arthur Prager, Albuquerque Gas & Electric Co., Albuquerque.

Ten major committees will handle the sales rally for the association. E. Dorsey is in charge of the refrigeration group.

A promotional organ for the Christmas activity in the form of *Electri-News*, a well-illustrated monthly which has the support of all electrical interests, will have general circulation in every town and city in the territory. It will emphasize the economies and conveniences of electrical appliances.

For the fourth successive year, the association will furnish large, colorful, wreath window-stickers, window and showcase banners, and other material conveying the "Give Something Electrical for Christmas" message. This material will be furnished free to hardware, music and electric shops, furniture and dry goods stores, and others participating in the movement.

This material, combined with the circulation of the *Electri-News*, radio announcements, billboards, newspaper, and other advertising, is expected to array the "Give Something Electrical" story to every man, woman, and child in three states.

ROOT TO DIRECT DEALER SALES ON TIMKEN BURNER

DETROIT—Frank M. Root has been appointed sales manager of the dealer division of the Timken Silent Automatic Co., oil burner manufacturer, according to an announcement made by E. V. Walsh, vice president in charge of sales.

Mr. Root was formerly connected with the merchandising department of the Easy Washing Machine Corp.

At present Mr. Root is recovering from injuries incurred in an automobile accident which happened shortly after the announcement of his appointment.

Seattle Hardware to Sell Leonards

DETROIT—Seattle Hardware Co., a 51-year-old concern, has been franchised as a Leonard distributor, accord to Godfrey Strelinger, sales manager of the Leonard Refrigerator Co.

A. S. Burwell heads the company, other officers being C. H. Black, vice president and general manager; N. C. Speir, vice president in charge of purchases; J. C. Black, treasurer; and R. P. Ballard, secretary. Sales managers are T. J. Templeton, in charge of dealer sales, and W R. Case, in charge of industrial sales.

G-E Franchises Three New Dealers

NEW YORK CITY—Three new dealers have been franchised by the air-conditioning department of General Electric Co., and will sell the complete line of G-E air-conditioning equipment, including small and large oil furnaces.

The new dealers are: Paddock's 311 S. Second St., Clinton, Iowa; United Electric Co., 1538 Central Ave., Dubuque, Iowa; and the Rock Island Fuel Co., 304 23rd St., Rock Island, Ill. Last dealer will also cover Davenport, Iowa, and Moline and East Moline, Ill.

NEW RECREATION HALL BUILT BY SERVEL

EVANSVILLE, Ind.—Just completed for use by factory employes of Servel, Inc., here is a new recreation hall and lunchroom which will accommodate 300 persons. The building, within a few minutes' walk of all the Servel factory buildings, was formally dedicated Nov. 22 at a banquet given by the Servel management.

44 STAR KELVINATOR SALESMEN WILL BE GUESTS AT FACTORY

DETROIT—Forty-four star Kelvinator salesmen who broke their 1933 quotas on deluxe models will be guests of the factory here Thursday and Friday of this week. Each man earned the trip by selling 100 or more cubic feet of deluxe models.

Thursday's program includes a trip through the factory and a tour of the city, while Friday morning and early afternoon will be devoted to a trip through the Grand Rapids Kelvinator plant. Friday night a dinner will be given in honor of the visitors at the Detroit-Leland hotel.

The following men, listed by their distributorships, will make the trip:

J. L. Swinger, Williams Distributing Co., Clarksburg, W. Va.; Philip Dalrymple, Lawrence, Mass.; D. H. Cashwell, Carolina Kelvinator Co., Greenville, N. C.; H. F. Newsom, C. H. Briggs, and L. H. Paul, Isaac Walker Hardware Co., Peoria, Ill.; R. G. Quinn, Ozark Motor & Supply Co., Springfield, Mo.

C. C. Chambers, W. S. Twentyman, Mr. Rouch, L. C. Wiswell, Jr., M. C. Lockwood, and P. H. Randlew, L. C. Wiswell Co., Chicago; C. E. Buchman, New York Kelvinator branch; Stanley Batty, James Carrigan, Herman Kruger, and Mehran Mooradian, Albany Garage Co., Albany, N. Y.

Roger Putnam and Carl Tarkow, Witte Hardware Co., St. Louis; Walter Boyd, F. C. Berthel, W. A. Williams, A. W. MacNichols, J. H Riley, Paul Letcher, W. S. Riley, Earle Rogers Co., Wheeling, W. Va.; Abe Alperin, Kirkmyer Electric Co., Richmond, Va.

Ben Heston, W. M. Purdy, and F. E. Reese, Richards & Conover, Kansas City, Mo.; C. M. Cressy, Kelvinator-Rowlands Co., Lima, Ohio; W. L. Sullivan, Pixley Electric Co., Columbus, Ohio; Harvey Smith, Thurman & Boone, Roanoke, Va.; Martin A. Diller, Landis Electric Co., Lancaster, Pa.

C. L. Kittle, C. K. Owen, R. N. Moore, Fred Couden, and Frank Petty, Pearson Piano Co., Indianapolis; Jack Burson, Jack Hallawell, and Don O'Connor, Stambaugh Thompson Co., Youngstown, Ohio; Lewis Zemel, Rackliffe Bros. Co., New Britain, Conn.

SALESMAN'S CARD BRINGS SALE THREE YEARS LATER

EAST ORANGE, N. J.—Literature and the salesman's card left with a prospect in Sept. 1930, were responsible for a Westinghouse refrigerator sale made Aug. 14, 1933, by Walter Rothfuss, sales director of the East Orange branch of Electric Equipment Corp., New Jersey distributor.

Mr. Rothfuss called on a Mrs. Duffield in Irvington, N. J., three years ago. She seemed interested in Westinghouse refrigeration, but not entirely sold. After covering the subject thoroughly, the salesman left his business card and some literature on the Westinghouse in the hope she might change her mind.

Three years later Mrs. Duffield came to the East Orange store, reached into her handbag, and produced a business card and promotion piece on the WL line.

On being referred to Mr. Rothfuss, whose card she had, she immediately placed an order for a BL-65.

WOMEN GET PROSPECTS IN HOUSE-TO-HOUSE CANVASS

SHEBOYGAN, Wis.—Two women experienced in house-to-house contact work have instituted a new kind of canvass for M. E. French of Honold & La Page, Inc., Westinghouse dealer here.

Mr. French hires the women to call on housewives with a "leader" such as the Handy Dryer. Gaining access to the home, the women make notes of the appliances in use there, including the make and age of each.

Five cents for each report and a commission varying from 10 to 15 per cent on sales is paid the women, each of whom turned in two refrigerator prospects the first day. Mr. French helps them in closing.

WESTINGHOUSE DISTRIBUTOR PROMOTES HOLMAN

NEW YORK CITY—George Holman, formerly floor manager at the Livingston St. store of Times Appliance Co., Westinghouse distributor here, has been promoted to a sales directorship in that organization.

DIXIE-MAYTAG TO SELL GRUNOW RADIOS

CHICAGO—Dixie-Maytag Corp. of Nashville, Tenn., has been appointed distributor of Grunow radios, according to officials of General Household Utilities Co. here.

COMPANION MERCHANDISE

DELIVERIES MADE ON NEW GRUNOW RADIOS

CHICAGO—Deliveries are now being made in every section of the country on all models in the nine-model Grunow radio line, it has been announced by W. C. Grunow, president of the General Household Utilities Co.

Five console models, three small sets, and a remote control model comprise the line. Features of the Grunow line are "living tone," Si-lec-trol, remote control, bi-selector tuning, sychrodynamic speakers, automatic volume control, police band, dual-wave coverage in every model, push-pull and parallel push-pull in larger models, stepless tone control, visual tone and volume indicators, and glareless high-visibility dials.

Model 901 and 902 consoles are 9-tube sets, with similar features but different cabinets. Model 1201 is a 12-tube set with six-legged cabinet of matched crotch and butt walnut, and with sliding doors concealing the tuning panel and grille.

Model 801 is an 8-tube console housed in a cabinet of matched butt and crotch walnut and burl maple with tulipwood inlays. Model 701 is a 7-tube console.

The Grunow remote control model features the jewel box remote control, Si-lec-trol, a 12-in. dynamic speaker, and an 11-tube circuit.

Of the small sets, model 700, a table model, has practically the same chassis as model 701, but with an 8-in. dynamic speaker; model 500 is a 5-tube, a.c. table job with a 6-in. dynamic speaker; and model 501 is a 5-tube, a.c.-d.c. set of the oblong type.

Dealer Meetings Held By Grunow

CHICAGO—Dealer and salesman meetings featuring the Grunow radio line are now being held in all parts of the country by distributors of General Household Utilities Co.

Among recent meetings were two held by the F. B. Connelly Co. in Portland, Ore., and Seattle, Wash. Retailers in that area saw and heard the new line presented by J. J. Davin, sales promotion manager for General Household; W. E. Daren, Pacific Coast division manager; and Glenn Connelly, Don H. Slocum, Walter R. McCurdy, and others from the distributorship.

Dealers and salesmen in southwestern Kansas met in Dodge City, Kan., to hear H. B. McCall, A. D. Siebert, and C. M. Willis from the Southwest Distributing Co. in Wichita discuss the new radio line.

Griffith-Victor Distributing Corp. of Indianapolis held a three-day meeting at the Hotel Severin. W. C. Griffith, president, and G. F. Hyde, sales manager, conducted the meeting.

At sessions of the H. Poll Electric Co., Toledo, speakers included Henry Poll, president; C. H. Grove, sales manager; Mr. Davin; and G. H. Deacon, district sales manager for General Household Utilities. Some 200 dealers attended the meeting of the Shapiro Sporting Goods Co. in Newburgh, N. Y.

Uses of Stainless Steel Discussed

CINCINNATI—"Industrial Uses of Stainless Steel" was the subject of a talk delivered here at a meeting of the American Society of Mechanical Engineers Nov. 23 by C. C. Snyder of the central alloy division, Republic Steel Corp., Massillon, Ohio.

Prefacing his address with a brief history of the development of stainless steel, Mr. Snyder divided present types of stainless steel into main groups, giving their general characteristics and properties.

Latter part of the talk stressed the use of stainless steel in various industries today, including building, meat packing, brewing, automotive, and chemical and allied fields.

Ranges Sold by Utility On Long-Time Plan

MONROE, N. Y.—The Orange & Rockland Electric Co. has placed a new sales plan in operation here, a long-time purchase plan which enables the consumer to own a modern electric range at a monthly cost no higher than a rental charge.

The range sold is a Standard model. For $1.25 a month the consumer becomes the owner of the range at the expiration of the payment period. There is an initial down payment of $15 to cover the cost of installation.

Majestic Develops New A.C-D.C. Model

CHICAGO—Just announced by Grigsby-Grunow Co. is the new Majestic "Mayfair" radio model, an a.c.-d.c. set with six-tube superheterodyne receiver.

The new set employs two duo-valve self-shield tubes, Majestic engineers claiming that this feature gives an eight-tube performance. It has delayed automatic volume control, pilot light, self-contained aerial, and superdynamic speaker. The kilocycle range is from 540 to 1730, and the set receives police calls within that range.

The cabinet is hand-rubbed to a piano finish.

DITZELL SEES SALES TO UNWIRED HOMES

CHICAGO—That America's 10,000,000 unwired homes represent one of the biggest potential new-business opportunities for radio dealers is the opinion expressed by John F. Ditzell, Majestic's general sales manager.

"This market," states Mr. Ditzell, "has been practically untouched in the past. The shortcomings of old-style storage battery receivers have been too great. The result is seen in statistics which indicate that only one unwired home out of nine enjoys the advantages of radio, while six out of nine wired homes now have radios.

"The development of the new Eveready air cell 'A' battery is a forward step. As soon as we heard of it, we set our Majestic engineers to work designing a receiver that would make use of this battery, and the result is a Majestic 'Air Cell' receiver."

The new Majestic receiver, according to Mr. Ditzell, includes such Majestic features as the duo-valve superheterodyne circuit, which is claimed to add the efficiency of two extra tubes to the 5-tube "Air Cell" chassis.

Other features include a permanent-magnet dynamic speaker and automatic volume control.

The new Majestic chassis is housed in a console cabinet which holds the complete outfit of batteries. The cabinet comes in all-over walnut finish and has side panels of cross-banded sliced birch and a butt-walnut overlay on the center panel.

4 OIL COMPANIES START COOPERATIVE CAMPAIGN

CHICAGO—Four fuel oil distributing companies here have opened an aggressive advertising campaign to combat the intensive promotion drive for house heating that has been carried on by the local gas companies during the past few months.

The oil companies, which include Apex Motor Fuel Co., Arrow Petroleum Co., Braun Bros., and Triangle Oil Co., are using newspapers, radio, and billboards for the story of oil heat.

A number of oil burner dealers have tied in with the oil distributor's publicity with newspaper advertising.

The oil burner group is fighting not only the gas companies but also an aggressive campaign put on by the coal companies, who were forced into the battle by the gas publicity.

OIL BURNER SALES GAIN IN SEPTEMBER

WASHINGTON, D. C.—Shipments of domestic oil burners for September were slightly greater than those for September, 1932, making the fourth consecutive month in which shipments of domestic oil burners were ahead of the corresponding month last year, according to figures compiled by the U. S. Bureau of the Census on 103 manufacturers.

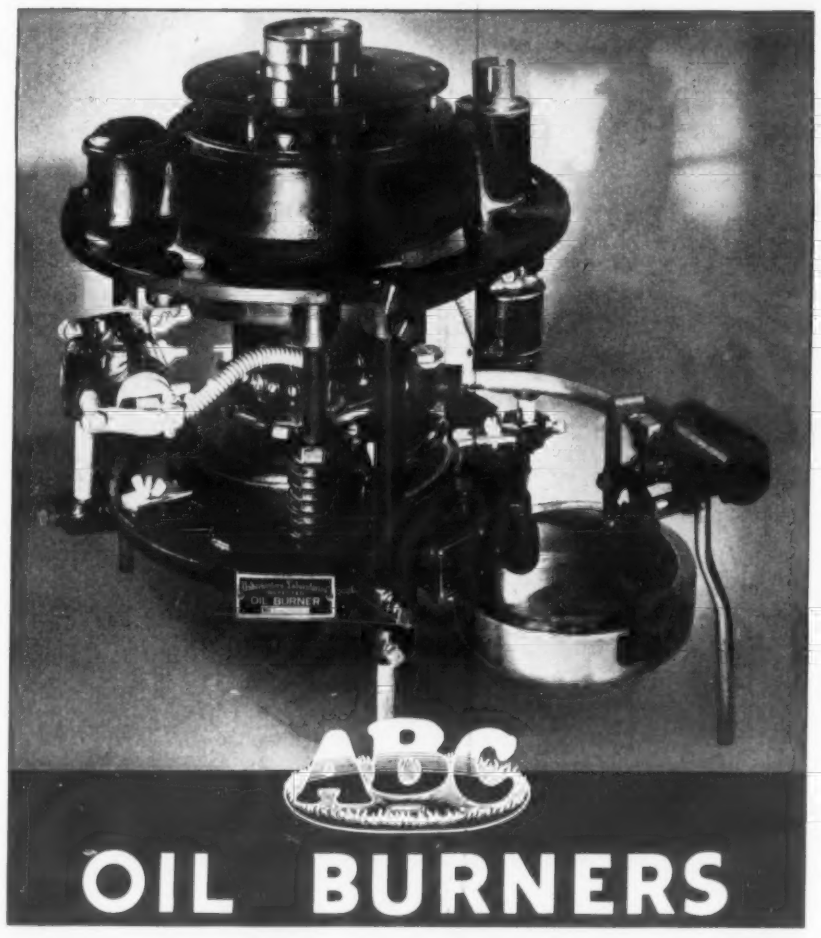
Shipments for September totaled 10,217 units, or an increase of .8 per cent over last year.

However, total shipments for the first nine months showed a decline of 9.1 per cent as compared with the first three-quarters of last year.

Heatter Comments on News for Grunow

NEW YORK CITY—Featuring Gabriel Heatter, news commentator, a series of broadcasts has been started over this city's station WOR, sponsored by the General Household Utilities Co. of Chicago.

Why LEADING SPECIALTY DISTRIBUTORS AND DEALERS *are selecting*



PRODUCT—In 1920, a pioneer—today, the outstanding name in oil heat! 13 years of manufacturing leadership and engineering dependability—of steady growth and consistent improvement. The ABC Oil Burner is a home appliance that *sells!* Its exclusive *Mistolator* principle of combustion provides the kind of flame for which 90% of domestic heating plants were designed. Thousands of installations all over the country testify to efficient operation.

PACKAGE MERCHANDISE—Think of being able to sell oil burners like package merchandise! That's exactly what ABC's new Merchandising Plan permits you to do. Service Depots install the burner and handle all servicing. You simply make the sale—and a sizeable profit that doesn't melt away! It's the first time in the history of the oil burner industry that sales of burners have been simplified. Oil burner profits can be yours without increasing your overhead a single cent!

LARGE UNIT SALE—You make more money with fewer sales because the ABC Oil Burner is a large unit sale. Distributors and dealers alike enthusiastically endorse ABC as an item that brings bigger profits with the same sales effort. Concentrate your selling activities on a home appliance that *increases* your profit!

PROFIT—An ABC Franchise is a four-fold opportunity for profit. First, it opens up a tremendous *new* market for you among your *old* customers—prospects whom you know and whose good-will you already have. Second, under the ABC Merchandising Plan, the profit you make is the profit you *keep*. Your margin doesn't trickle away in installation and service calls. Third, oil burner sales are made when other home appliance sales are falling off. Oil burners bridge seasonal gaps—you keep your sales organization busy 12 months of the year! Fourth, ABC's complete line of power and range burners and water heaters brings year 'round sales opportunities and new customers for other merchandise.

PROMOTION—All of ABC's merchandising activities are centered on you. ABC helps you to make sales—not only by established Service Depots, but also by planned factory co-operation. Powerful sales tools like the new ABC Salesmen's Presentation—80 pages of *real selling help!* Sales literature both for mailing and for store distribution. All this, backed by a Merchandising Plan that has been *tested* in the home appliance field!

INVESTIGATION—Already a number of large home appliance distributors have lined up with ABC. Their success is proof that profits can be made with ABC Oil Burners. Write to them—find out why they're so enthusiastic about ABC as a source of real profit. Talk to home owners who have installed ABC Burners—we'll be glad to provide you with a list of installations in your vicinity. And don't forget, our plant is open for inspection at any time that's convenient for you!

Read what these leading home appliance distributors say:

"Our next major merchandising activity will center around the ABC Oil Burner. The product is time-tested and proven, it represents a high unit of sale, and offers substantial profit to both distributor and dealer."

DAVID M. TRILLING, *Partner in* Trilling & Montague

"Right now is the time for our dealers and ourselves to accept the rapidly increasing opportunity for business and profit presented by the power burner market, just as we accepted the same opportunity when it was presented by radio and refrigeration."

J. H. BURKE, *Pres.*, J. H. Burke Company

"We have been successful in closing many of the largest dealers in our territory, who accepted the ABC proposition because it was merchandised properly, because the product is correctly designed, and skillfully constructed and because it is profitable."

MAX H. KRICH, *Gen. Mgr.*, Krich Distributing Company

"Your very able presentation has helped us immensely in actually signing up a good number of very choice dealer accounts whom we never dreamed would be interested in selling oil burners. The broadening of the market and year 'round sales opportunities afforded by your range burners and water heaters, making for completeness of the ABC line, have been tremendous aids."

CHARLES G. D'ELIA, *Pres.* D'Elia Electric Company, Inc.

Write for complete details today! *There's no obligation!*

AUTOMATIC BURNER CORPORATION

1823 CARROLL AVENUE • • • • • • CHICAGO, ILLINOIS

STATISTICS

Potential Market of 20 Million Is Doubted by Investment House

Sydney Stein Jr. and Associates
Investment Managers and
Financial Consultants
120 S. LaSalle St., Chicago
Nov. 25, 1933.

Editor:

During our study of the potential market for mechanical refrigeration, many people have told us this market is about 25 per cent saturated. Apparently this figure is based on the estimate that 5,000,000 boxes are in use in the United States and that there are between 20 and 21 million wired housing units.

To check the logic of the 25 per cent saturation estimate, we have compiled some statistics from the Statistical Abstract of the United States for 1932 and the Treasury Department's "Statistics of Income" for various years. We are enclosing a copy of these figures and would like your reaction to them.

Without having made an exhaustive analysis, we feel it an exaggeration to say there is a potential market for about 20 million household boxes in the country for these reasons: 1. The largest number of individuals ever to file income tax returns in one year totaled 7,698,321, and 2. There are only about 15,840,000 native white families in the United States, excluding those living on farms.

We appreciate the fact that there are around 22,000,000 passenger automobiles registered in the United States but feel that people will make much bigger sacrifices to have a car than to own a mechanical refrigerator.

We will appreciate having your ideas on this subject.

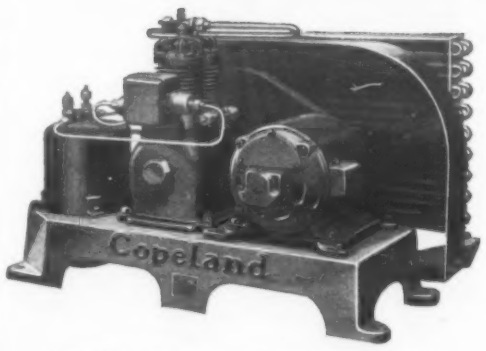
BROWER HALL.

STATISTICS TO BE CONSIDERED IN ESTIMATING SATURATION OF DOMESTIC MARKET FOR HOUSEHOLD MECHANICAL REFRIGERATORS

	Units
1. Estimated world sales of electrical refrigerators 1927 to Sept. 30, 1933, inclusive	5,024,000
Exports, 1927 to 1933, estimated at 6 per cent (based on 1927-29)	336,000
Estimated number of domestic sales of electrical refrigerators, 1927 to 1933	4,688,000
Estimated number of domestic sales of gas refrigerators, 1927 to 1933	350,000
Estimated number of total domestic sales of mechanical refrigerators, 1927 to 1933	5,038,000
It is assumed that boxes sold before 1927 are obsolete.	
Also that 65 per cent of those sold in 1927, 50 per cent sold in 1928, and 15 per cent sold in 1929 are obsolete, a total of	569,000
Estimated number of household mechanical refrigerator units in use at present in the United States	4,469,000
2. The largest number of individual income tax returns in the United States for any year was 7,698,321 in 1923. In that year married people with net incomes of $2,000 or more and single persons with $1,000 or more net incomes were obliged to file returns; also anyone with gross income of $5,000 or more.	
In 1929 4,044,327 individual returns were filed.	
In 1930 3,376,552 individual returns were filed.	
In 1931 3,116,317 individual returns were filed.	
For the years 1929 to 1931, inclusive, married exemption figure was $3,500 and single $1,500. The gross income figure was $5,000.	
3. Total number of families in United States, 2930 census	29,904,663
Total number of dwellings in United States, 1930 census	25,205,000
Total number of one-family dwellings	22,833,110
Total number of two-family dwellings	1,728,087
Total number of families provided for in 1- and 2-family dwellings	26,289,270
This accounts for about 88 per cent of all families, balance of 12 per cent or families must have resided in apartment buildings of over two apartments per building.	3,615,389
4. Total number of urban native white families in United States in 1930	11,396,000
Total number of rural native white families in United States in 1930	10,101,000
Total number of urban native white families and rural native white families not living on farms	15,840,000
5. Total number of wired housing units in the United States (approximate)	20,500,000
6. Total number gainful workers in U. S. of 10 years of age or more, 1930	48,830,000
Total number gainful workers in U. S. of 10 years of age or more, 1930, in all classes of occupation, except agriculture, forestry and fishing, domestic and personal service	33,204,000
Of these, about 72 per cent are native born whites	23,907,000
Males constitute about 77 per cent of 23,907,000 or	18,408,000
Females constitute about 23 per cent of 23,907,000, or	5,499,000

Note: Sales figures are from Electric Refrigeration Bureau.
Tax figures from Statistics of Income—U. S. Treasury.
Other data compiled from Statistical Abstract of the U. S. for 1932, and from data furnished by Department of Commerce.

Better Than Ever In 1934!



Model XA, 1½ h.p. Air-Cooled Condensing Unit

Copeland Commercial Models For All Purposes

Some Valuable Franchises Available

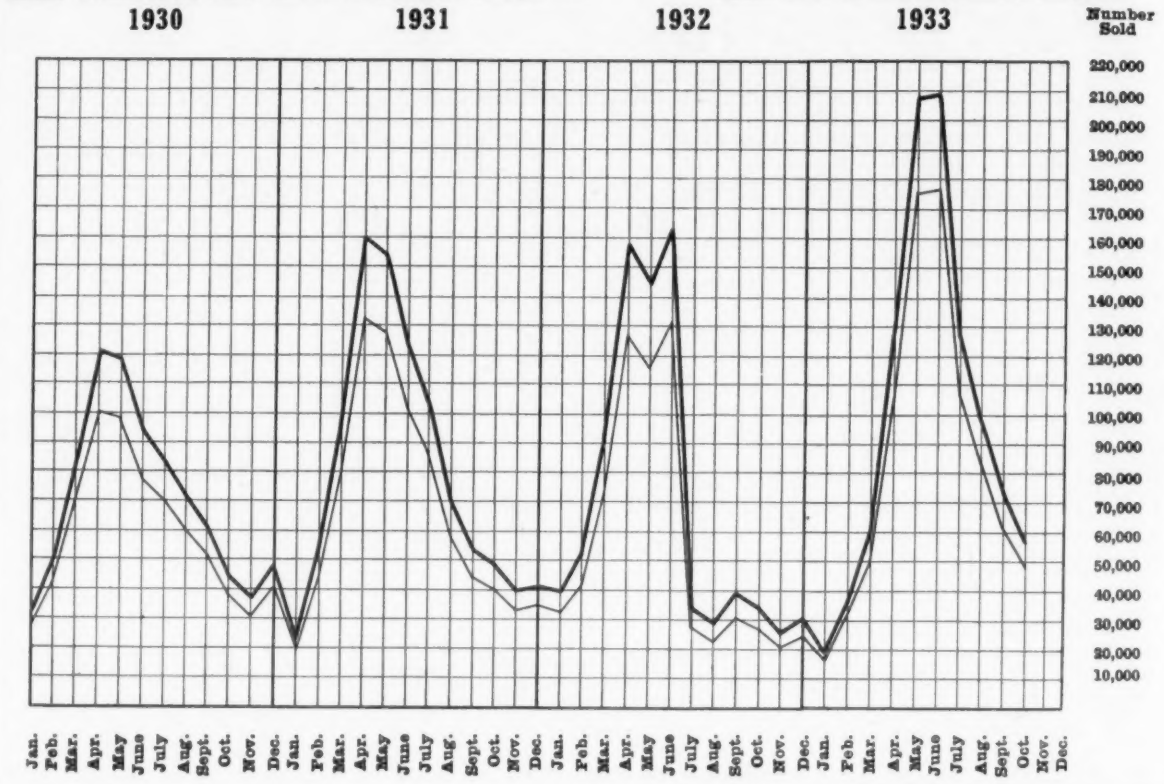
Write for Particulars

Copeland

DEPENDABLE Electric Refrigeration

Copeland Refrigeration Corp.
Mt. Clemens, Mich.

Seasonal Decline Less Than in Previous Years



Sales for October 66% Higher Than Same Month in 1932

IT is estimated that manufacturers of household electric refrigerators sold 56,700 units during October, 1933. Members of the Refrigeration Division of the National Electrical Manufacturers Association were responsible for 47,726, or about 84.1 per cent of the total for the month.

That the seasonal decline during 1933 has not been as marked as in previous year is evidenced by the fact that October sales for the current year were about 66 per cent above the same month of 1932 and nearly 18 per cent in excess of October, 1931. The recession from the peak reached in June has been fairly normal, the sales curve leveling off regularly rather than indicating a sharp decline.

It is of interest to note that beginning with May sales during each month of the current year exceeded those of corresponding months of any previous year in industry history. The peak of 208,700 units reached in June of this year set an all-time record for sales in any one month.

Cumulative sales for the first 10 months of this year which were estimated to be approximately 1,013,200 were about 27 per cent higher than for the same period of 1932 and more than 13 per cent above the 10 months volume for 1931, the previous best year in the history of the refrigeration industry. Members of the Refrigeration Division of Nema sold 852,589 household electric refrigerators in the 10 months accounting for 84.1 per cent of the volume.

The graph on this page compares the curves of household sales by all manufacturers and by Nema members from January, 1930, through October of this year, the latest month for which figures are available. The table which follows lists monthly and cumulative sales during the same period:

	1930		1931		1932		1933	
	Monthly Sales	Cumul. Sales	Monthly Sales	Cumul. Sales	Monthly Sales	Cumul. Sales	Monthly Sales	Cumul. Sales
January Totals	**34,000**	**34,000**	**22,700**	**22,700**	**39,400**	**39,400**	**19,400**	**19,400**
Nema Only	28,356	28,356	18,917	18,917	31,527	31,527	16,351	16,351
February Totals	**51,000**	**85,000**	**54,700**	**77,400**	**52,600**	**92,000**	**36,200**	**55,600**
Nema Only	42,362	70,718	45,503	64,420	42,109	73,636	30,422	46,773
March Totals	**84,500**	**169,500**	**96,600**	**174,000**	**91,500**	**183,500**	**59,200**	**114,800**
Nema Only	70,291	141,009	80,320	144,740	73,215	146,851	49,823	96,596
April Totals	**121,000**	**290,500**	**159,300**	**333,300**	**158,300**	**341,800**	**127,600**	**242,400**
Nema Only	100,500	241,509	132,414	277,154	126,620	273,471	107,182	203,778
May Totals	**118,500**	**409,000**	**153,500**	**486,800**	**144,200**	**486,000**	**208,200**	**450,600**
Nema Only	98,621	340,130	127,671	404,825	115,348	388,819	175,119	378,897
June Totals	**93,000**	**502,000**	**122,200**	**609,000**	**163,300**	**649,300**	**208,700**	**659,300**
Nema Only	77,174	417,304	101,492	506,317	130,607	519,426	175,550	554,447
July Totals	**83,000**	**585,000**	**103,800**	**712,800**	**33,500**	**682,800**	**127,300**	**786,600**
Nema Only	69,506	486,810	86,419	592,736	26,794	546,220	107,081	661,528
August Totals	**72,000**	**657,000**	**69,800**	**782,600**	**28,900**	**711,700**	**98,100**	**884,700**
Nema Only	59,680	546,490	58,021	650,757	23,124	569,344	82,495	744,023
September Totals	**62,500**	**719,500**	**53,200**	**835,800**	**38,100**	**749,800**	**72,300**	**957,000**
Nema Only	51,969	598,459	44,262	695,019	30,513	599,857	60,840	804,863
October Totals	**45,000**	**764,500**	**48,100**	**833,900**	**34,100**	**783,900**	**56,700**	**1,013,700**
Nema Only	37,576	636,035	39,999	735,018	27,294	627,151	47,726	852,589
November Totals	**37,000**	**801,500**	**39,600**	**923,500**	**26,300**	**810,200**		
Nema Only	30,777	666,812	32,879	767,897	21,029	648,180		
December Totals	**48,500**	**850,000**	**41,500**	**965,000**	**30,100**	**840,300**		
Nema Only	40,238	707,050	34,459	802,356	24,078	672,258		

UNIVERSAL COOLER GETS ORDER FOR SIX TRUCKS

DETROIT—Universal Cooler Corp. has recently received an order for six refrigerated trucks from the newly formed H. A. McDonald Creamery Co. of this city, according to an announcement made by Thomas Blackett, Universal Cooler's commercial sales manager.

Universal Cooler will furnish the condensing units for the trucks, Kold-Hold Corp. the lowsides, and R. Joynt & Sons of this city will build the bodies.

Each of the six trucks will have a capacity of 400 gal. of ice cream, and will maintain an inside temperature of -5° F.

The trucks will be equipped with Universal Cooler's new special truck condensing unit model 1002-T, a 1-hp., two-cylinder model.

Three Kold-Hold evaporator units, employing a eutectic solution, will be placed in the interior of each truck.

Cleveland Store Opens Range Campaign

CLEVELAND—Sterling & Welch Co., house furnishing firm which serves northern Ohio from this city, on Dec. 1 opened a sales campaign on Universal electric ranges, announced J. E. Dean, district representative for Landers, Frary & Clark.

Sterling & Welch Co. has installed a complete electric kitchen in its newly decorated model home and is planning an advertising campaign.

James A. Foukal, manager of the electrical department of Sterling & Welch Co., declares that "as far as we know, we are the first retail store in Cleveland to devote planned and coordinated advertising to the electric range."

SAMUEL LEWIS ADDRESSES DETROIT ENGINEERS

DETROIT—Samuel R. Lewis, past president of the American Society of Heating and Ventilating Engineers and author of the book "Air Conditioning for Comfort" addressed the Detroit section of the A.S.H.V.E. here Monday night on distributing systems for air conditioning. The paper will probably be published in an early issue of ELECTRIC REFRIGERATION NEWS.

Sales Increase 37% in First Nine Months in Philadelphia Territory; 39,965 Units Sold

(Concluded from Page 1, Column 4)

In 1932, 29,226 refrigerators with a retail value of $6,380,488 were sold during the first nine months of the year.

Says Mr. Conover regarding retail prices of electric refrigerators in Philadelphia:

"It is interesting to note that the average price of an electric refrigerator in the Philadelphia territory decreased from $218 in 1932 to $175 this year."

Month	1933 Units Sold	1932 Units Sold	1931 Units Sold	1933 % Inc. or Decrease Over 1932	1933 Retail Value	1932 Retail Value	% Increase or Decrease	1933 Average Price	1932 Average Price
January	1,033	1,545	917	— 33%	$ 206,740	$ 340,083	—39%	$200	$220
February	1,107	1,711	992	— 35%	212,167	373,115	—43%	192	218
March	2,072	2,365	2,545	— 12%	380,358	520,221	—27%	184	220
April	4,621	4,473	5,178	+ 3%	831,969	945,777	—12%	180	211
May	7,973	5,969	4,071	+ 33%	1,355,090	1,292,544	+ 5%	170	217
June	11,399	7,104	3,681	+ 60%	1,894,764	1,576,049	+20%	166	222
July	4,553	2,473	3,754	+ 85%	819,098	545,483	+50%	180	220
August	4,384	1,885	2,214	+133%	797,875	424,798	+88%	182	224
September	2,823	1,701	1,930	+ 66%	511,889	362,418	+41%	181	213
Totals	**39,965**	**29,226**	**25,282**	**+ 37%**	**$7,009,950**	**$6,380,488**	**+10%**	**$175**	**$218**

ENGINEERING

NEW DATA GIVEN ON CONDENSING WATER IN AIR CONDITIONING

(Concluded from Page 1, Column 3)

Mr. Fleisher assumed a 35° F. suction temperature and an 86° F. condensing temperature, with no superheat. For water, he took a standard condition of 45° F. suction and 86° F. condensing temperature. The charts were based on temperature ranges of 5, 10, 15, and 20° F.

First series of charts showed tonnage developed for different condenser temperatures with a constant volume machine. Tonnage dropped off for a given suction temperature in each case as the condensing temperature increased, the reduction in tonnage being approximately the same for ammonia and methyl chloride, but at a greater rate for F-12. As the suction temperatures increased from 25 to 45° F., tonnage increased at varying rates for the different refrigerants.

Theoretical Charts

Another group of charts showed the horsepower per ton of the refrigeration, and the variation in this value for different suction temperatures with a variation in condensing temperature. Mr. Fleisher emphasized the fact that these curves are theoretical, the actual horsepower required being dependent upon the volumetric efficiency and mechanical losses of the compressor.

A third set of curves gave the variation with condensing temperatures of condenser water consumption (in gals. per minute) per ton of refrigeration, for temperature rises of 5, 10, 15, and 20° F. Still another set of curves showed the gallons of condensing water required per minute per ton of refrigeration with the different refrigerants. These were based on the condensation of 1 lb. of refrigerant.

Cost of Added Power

Mr. Fleisher then explained that one of his purposes in presenting the data was to help determine when it is cheaper to increase the horsepower at a prevailing power cost, when it would be better to buy additional water and save the cost of additional power, or whether a colder source of water is available which might cut the power costs.

"From the charts, the increase or decrease in tonnage from the standard air-conditioning basis of 35° F. suction and 86° F. condensing temperature can be traced, and the horsepower and water requirements taken. Then, knowing the cost of water and electricity, a selection of a base can be determined. As the volume of gas handled with a fixed r.p.m. does not vary, the size of the machine for flexibility of operation may also be determined," he stated.

Charts on Steam Ejector

Unlike the charts described above, the next two on steam-ejector refrigeration systems were based on practical test data because the performance of steam jets varies so greatly from the theoretical that useful data is not obtainable except experimentally, Mr. Fleisher said.

The two curves on the steam jet showed (1) condenser temperatures plotted against steam consumption in lbs. per hour per ton of refrigeration with different suction or evaporation temperatures and (2) gallons of condenser water per ton per minute with varied condensing temperatures.

"In air conditioning, the wet-bulb temperature of outdoor air is an important factor in determining the load of a system in tons of refrigeration," he pointed out next in proceeding to a discussion of cooling towers.

Cooling Towers

Cooling towers are coming into use with air-conditioning systems particulariy in congested districts where water supply is expensive—and where it may be inadequate in the summer months when air conditioning is most wanted, he explained.

From his charts of condenser performance, he showed that the horsepower requirement of a system varied considerably with the temperature of the condensing water and that the number of gallons of condenser water required per ton of refrigeration varies with its temperature, so that it is necessary to design and select a refrigeration system using a cooling tower in such a way that any changes in the prevailing wet bulb will not adversely affect the capacity of the refrigeration system.

"It must also be borne in mind where a cooling tower is part of a refrigeration system in localities where high wet bulb may be obtained from time to time, that the machine and refrigerant must be such that the available condenser water from the cooling tower is not so close to the critical temperature of the refrigerant that difficulty is encountered in effecting condensation of the gas," he warned.

In this connection he urged the engineers to consider the maximum wet-bulb temperature that might be expected when the maximum load is imposed on the refrigeration system.

Because water temperatures are one of the controlling factors in application of the reversed refrigeration cycle to air conditioning, Mr. Fleisher next turned to discuss the reversed cycle from the standpoint of outside temperatures, inside conditions, and the heat obtainable from the condensation part of the cycle.

"The reversed cycle is nothing but the utilization of that heat in the condenser water which ordinarily is wasted during the refrigeration season, and the extraction of heat from out-of-doors to perform the evaporation portion of the cycle," he said.

This special method of heating has been known for a considerable time and has been successfully applied in certain localities. One of the requirements for its use is that the evaporator temperature be sufficiently low so that it will extract heat from the surrounding medium—usually air. This evaporator temperature is usually taken at about 10° F. below outside air, he indicated.

High Condensing Temperature

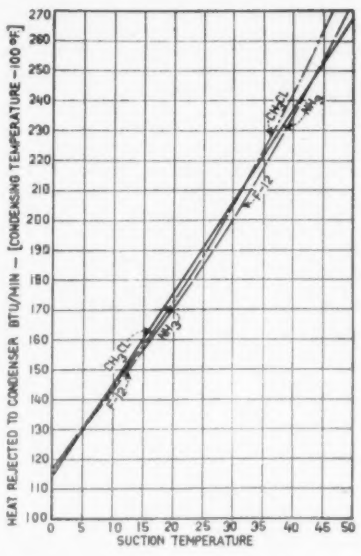
Another requirement is that the condensing temperature must be sufficiently high so that heat will be transferred from the refrigerant to the air and from the air to the room, and since the room or enclosure is maintained around 75° F., a condensing temperature should be maintained at not less than 100° F., according to the speaker.

He then showed that if a building requires 3 tons of refrigeration for cooling in summer, the system reversed for heating would be adequate for heating without auxiliary sources of heat only in localities where the outside temperatures do not rise above 38.5° F.

One of the curves presented by Mr. Fleisher is shown above. It shows the number of B.t.u.'s available for heating by reversing the refrigeration cycle with a condenser temperature of 100° F., with the suction temperature adjusted to outside minimum temperatures.

He pointed out with this curve how rapidly the heat available for heating in winter rises with the rise of outdoor temperature. Thus, with a zero suction temperature (corresponding to about 10° F. outdoor temperature), only 115 B.t.u. of heat are available per ton, while at a 30° outdoor temperature (which would produce about a 20° suction temperature), 173 B.t.u. are available, or about 60 per cent more with the same machine.

Reversed Cycle



Showing B.t.u.'s available for heating with one ton of reversed refrigeration capacity.

Servel Cools Air in Operating Room

EVANSVILLE, Ind.—With installation of a Servel CSC-7 comfort-cooling unit, the Walker-Welborn hospital here is the first in the city to provide controlled temperature in the operating room.

Vapor-proof electrical fittings and motor equipment are used in the cooling unit, which may be manually controlled by the surgeon to produce temperatures ideal for various operations.

SHOWS NOISE FACTOR IN AIR CONDITIONING

NEW YORK CITY—"Noise Elimination and Air Motion" was treated by C. B. Graves, manager of the air-conditioning department of Campbell Metal Window Corp., before the joint A.S.R.E.-A.S.M.E. session on air conditioning here last Thursday.

Mr. Graves classified the noise problem into three major groups: 1. Street noises; 2. Industrial noises; and 3. Indoor noises, as concerned with commercial and living conditions.

To give an idea of the diversity of street noises, he showed graphically all the different sources of noise in New York streets, as conceived by the Noise Abatement Commission of New York City. This group has been working for five years on the local street noise problem.

In the second group, industrial noises, considerable strides have been made by some of the large corporations with their own studies of noise reduction. These include improvements in insulation of machinery mounting, in design of the machinery itself, and in transmission of energy, etc. which improve working conditions.

Probably the most extensive of the three noise groups is the third, Mr. Graves averred. One of the most recent contributions to abatement of indoor noise is the sound-proofing of subway cars, he said, one experimental car having been built so that noise is reduced about 70 per cent.

To eliminate indoor noises which are brought in from the street, he mentioned accoustically treated window ventilators which permit air to be drawn into a room without admitting street noises. H. P. Maxim's gun-silencer system has been applied by two makers of room-cooling units.

Sound-proofing of ducts is also being employed by installers of central air-conditioning systems, he pointed out. Thus an unlined duct 30'x10"x10" with an air speed of 3,000 ft. per minute, with a noise level of 54 decibels, will handle two-thirds more air flow with the same decibel rating if sound insulation is provided, he declared.

Refining Industry Early Users of Ejectors

NEW YORK CITY—Among the first users of steam ejectors, or thermal compressors, as they are also known, were companies engaged in refining petroleum, and to them goes much of the credit for developing the steam ejector to the point where it is now being applied to air-conditioning installations, F. D. Berkeley of the Ross Heater & Mfg. Co. declared before last week's A.S.R.E. meeting here.

Mr. Berkeley's company was recently acquired by the American Radiator & Standard Sanitary Corp. which is now marketing the Ross steam-ejector refrigeration system for air conditioning under the name of the "Decalorator."

The steam ejector is well over 20 years old, Mr. Berkeley said, and for about that length of time has been used to produce vacuums in oil refining and in the fatty acid industry. He showed a number of lantern slides of installations in such work, where as many as 12 ejectors have been hooked up together with valves to permit operation of any number of them.

He also showed diagrams of some of the steam-ejector systems devised by early experimenters such as Le Blanc. These early systems were not commercially useful until the modern barometric or surface condensers were developed, he said.

PROFESSOR TALKS ON RECOVERY PROGRAM

NEW YORK CITY—Speaking at the welcome luncheon of the A.S.R.E. convention here Tuesday noon, Walter Rautenstrauch, professor of industrial engineering at Columbia university, declared that we must get rid of those forces in our profit system of industrial civilization which are destructive to individual personality.

That should be the principal aim of the NRA, he said. Better as a name for this program than National Recovery Administration would be "National Reconstruction Administration," he believes, because it is reconstruction rather than recovery of 1929 conditions that our country is now in need of.

The main problem facing the NRA is how to permit the population of our country to participate in the processes of civilization so as to secure claims to the goods produced, he continued. There are four ways in which these claims can be secured, according to Prof. Rautenstrauch:

1. Dividends.
2. Barter and trade.
3. Attendance at the industrial processes.
4. Exercise of professional talents.

In the first two he said he failed to find anything which leads to the enrichment of human personality, therefore he would not have them in an ideal system.

The objectives of an interprise, according to Prof. Rautenstrauch, should be (1) on a high plane which would tend to release the creative qualities and permit a spiritual awakening, and (2) it should have a dependence on personality which would require competence and trusteeship.

The talk was broadcast by the National Broadcasting Co.

KEROTEST'S NEW 1934 CATALOG IS READY

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WHITESEL EXPLAINS G-E TESTING METHOD

(Concluded from Page 1, Column 2)

by vaporizing moisture from a thermos bottle.

Advantages cited for the new method are that any given set of field conditions can be duplicated by properly regulating the input to the lamp and to the thermos bottle heater. Also, it is not necessary to maintain a high humidity ambient, and it is not necessary to open cabinet doors except to add or remove the thermos bottle or the ice load charges.

All of the lamp heat, and heat which leaks through walls of the bottle is then given up to the cabinet air by convection. This increases air temperature in the cabinet, he showed, and consequently the cabinet wall temperatures.

Selecting Standard Field Conditions

Since no standardization of field conditions has yet been made by the industry, the standard conditions given in Table 1 have been assumed by Mr. Whitesel in his paper.

For a 6-cu. ft. single-door cabinet the heat added between noon and 6 p. m. for the various loads in accordance with the above specifications for heavy-duty conditions is equal to the following:

	B.t.u. per hr.
Food load	72
Ice-making load	135
Door-opening load	107
Total	314

In making these calculations it was assumed that the cabinet air temperature was 50° F., the final evaporator temperature 20° F., and the cabinet air dew point 25° F. The door-opening load was calculated from the formulas developed later in the paper.

"The 66° F. dew point for an 80° F. room corresponds to a relative humidity of 63 per cent, while the 80° F. dew point for a 100° F. room corresponds to a relative humidity of 54 per cent.

"The door-opening specifications given in Table 1 refer to only one door of the cabinet. For instance, a 10-cu. ft. two-door cabinet when tested in the 100° F. room should have a door-opening load equivalent to opening one door for 15 seconds every 10 minutes," he stated.

Ambient Temperatures Vary

"In the field, the ambient temperature will vary considerably during 24 hours in most parts of the country. However, the above specifications are based upon maintaining a constant room temperature and a constant room humidity, since it would greatly complicate the testing to try to duplicate variable ambient conditions.

"With the new method of testing, the food and door-opening loads are also applied at a uniform rate. This not only simplifies the testing, but it gives results that are more representative of average field conditions than would be obtained by trying to duplicate variable food and door-opening loads," Mr. Whitesel declared.

Table 1—Assumed Field Conditions

	Average Duty	Heavy Duty
Ambient		
Temperature, °F.	80	100
Dew point, °F.	66	80
Food load*		
Heat added, B.t.u./hr./ft.² 9 a. m. to 9 p. m.	7.2	12.0
Ice-making load		
Water charge, lb/ft.² in terms of rated volume (Vr) in ft.³		
7:00 a. m.	0.36—0.006Vr	0.72—0.012Vr
Noon	0.36—0.006Vr	0.72—0.012Vr
6:00 p. m.	0.36—0.006Vr	0.72—0.012Vr
Initial water temperature, °F.	75	90
Door-opening load		
Length of period, sec	15.0	15.0
Frequency of periods, no./hr./ft.² 9 a. m. to 9 p. m.	0.48	0.60

*Type of heat transfer to be equivalent to that obtained by charging in closed cans of water. Cans to be black, 5 in. in diameter, 3.5 in. tall, and having a heat capacity not over 4 per cent of water load. Water charge to be 1 lb. per can with initial temperature same as for ice-making load. Cans to be removed at end of 3 hrs.

Test Procedure

The adjoining diagram shows the proposed location of the lamp, thermos bottle, and cabinet air temperature points.

Two evaporator temperatures are recommended. The cabinet air and evaporator temperatures may be read by the use of thermocouples. The ice freezing time may be obtained by immersing a thermocouple near the top of a cube in the desired tray and noting the time when the temperature at this point begins to drop below 32° F.

Location of Apparatus

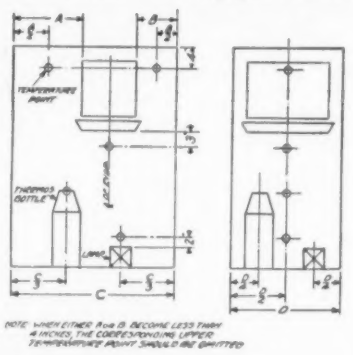

Diagram of lamp and thermos bottle apparatus used for load testing of household refrigerators.

"It is recommended that the control be set in the mid position for the 80° F. test and in the coldest position for the 100° F. test. The evaporator should be defrosted before the beginning of the test," he said.

"The thermos bottle should be put into the cabinet at 9 a. m. and removed at 9 p. m. The lamp and thermos bottle heats should be applied at uniform rates during this period between 9 a. m. and 9 p. m. The first ice-making charge should be applied at 7 a. m. and removed at noon, the second should be applied at noon and removed at 6 p. m., while the third should be applied at 6 p. m. and removed at midnight," the speaker explained.

"If the water is not completely frozen when it is removed, the amount that is frozen should be weighed. The amount and ingoing temperature of the thermos bottle water, the inputs for the lamp and the thermos bottle heater, and the amount and temperature of each ice-making charge may be obtained from load curves.

"As many ice trays should be filled to their rated capacity as the required charge will permit. The freezing time is then taken as that for the full trays. The cabinet doors should not be opened any oftener nor any longer than is necessary," he advised.

Energy Consumption

The energy consumption can be determined by a watt-hour meter and the per cent running time by a teleohron clock. Temperatures should be obtained for the center of the condenser, the compressor case opposite the center of the cylinders, if possible, and the top of the motor frame. These temperatures may be read by thermometers.

Mr. Whitesel recommended that in the side evaporator type of refrigerator the four cabinet air temperatures be averaged directly to obtain the grand average cabinet air temperature; while in the center evaporator type the two top temperatures should be averaged as one; and in the top evaporator type the temperature taken just below the evaporator should be used twice.

"In case the evaporator contains a hold-over solution, the per cent running time and the energy consumption for the 24 hours and for the period between 1 a. m. and 7 a. m. should be based on initial and final readings taken with the same evaporator temperature," he said.

Test Results

The first and second columns of Table 2 give the results obtained by the new, electrical method of load testing for a 6.7-cu. ft. cabinet in the 80° F. and 100° F. rooms. The control was set in the mid position for the former test and in the coldest for the latter, according to the speaker.

The third column of Table 2 gives the results obtained on the same refrigerator in a 100° F. room by the door-opening method of load testing.

"There was a slight draft in the room used for this test, which caused the compressor case and condenser temperatures to run slightly lower than they should have," Mr. Whitesel explained. "This, in turn, caused the running time and energy consumption to be slightly low. Taking these points into consideration, it is seen that the two methods of load testing give almost identical results.

"In the door-opening load test, the food load water cans were charged in at 9 a. m., noon, 3 p. m., and 6 p. m., the amount of water used for each charge being 1.0 lbs. per cu. ft. of capacity. The length of the door-opening period was 8.0 seconds per cu. ft. of capacity, and the frequency 0.30 periods per hour per cu. ft. All other specifications were the same as those called for in Table 1.

"It is evident that in the door-opening method both the food and the door opening loads depend to some extent upon the cabinet air temperature, while in the electrical method the heat load is entirely independent of the cabinet air temperature," he said.

"In the 100° F. room the loads for the two methods are equal when the cabinet air temperatures is 50° F., the average cabinet air temperature given in Table 2 for the load period of both of the 100° F. tests run above 50° F., but in the door opening method the actual temperatures just before the door was opened (which are not recorded in the table) averaged fairly close to 50° F., which means that the loads in both cases should have been about equal."

EDWARDS DESCRIBES RUBBER INSULATION

(Concluded from Page 1, Column 1)

of which depending on the form and density of the final product desired.

"This dough is partially vulcanized by placing it in a pressure vessel which can be heated externally. After the dough is placed in the pressure vessel, nitrogen gas is admitted until the vessel is filled to a pressure of about 3,000 lbs. per sq. in. After the nitrogen is added, the vessel and its contents are treated by steam or other suitable heating agent until a pressure of about 4,000 lbs. per sq. in. is created.

"As a result of the intense pressure, the nitrogen is driven into pores of the dough," Mr. Edwards explained. "At the same time, the expansion of the absorbed nitrogen resulting from heating causes the dough to expand.

Partial Vulvanization

"In the meantime, the application of heat causes a partial vulcanization of the dough, so that when it is removed from the pressure vulcanizer it has a consistency something like that of a rubber eraser or a piece of soft packing material," he explained. "Generally the dough is roughly formed to the shape of the desired article before impregnating and vulcanizing."

These bubbles of absorbed nitrogen are only partially expanded in the first vulcanization, and are capable of still greater expansion, Mr. Edwards states. Thus, in order to obtain an article of the desired shape and density, a piece of the impregnated and partially vulcanized dough is placed in a mould of the desired shape and further heated until completely vulcanized.

Finished Form

In the finished form, the material may be either very soft (suitable for pads or cushions), or it may be a hard ebony board, or it can be an intermediate form depending on the mixture and degree of vulcanization, according to Mr. Edwards.

Among its characteristics, he listed the following: the lightest known solid, high-insulating values, moisture-proof, resilient, high dielectric strength, easily moulded, vermin-proof, relatively inexpensive, and it is one of the strongest materials for its weight. Mr. Edwards also believes it to be one of the best practical heat insulators known.

Some of the physical properties of the material were first determined by the Department of Scientific and Industrial Research at the National Physical Laboratory in England, and were reported by Sir Alfred Ewing as chairman of the engineering committee. Special report No. 35 of this committee embodies some of these data, and is available from the British Embassy in New York City.

According to these tests, this material has a thermal conductivity of .20 B.t.u. per sq. ft. per hour per inch thickness for a 1° F. temperature difference.

Additional Tests

During the past year an industrial firm in this country made some additional tests on the substance, Mr. Edwards reported, developing the following information:

Density of the material in slab form is from 5.5 to 5.7 lbs. per cu. ft. Its yielding point is in the neighborhood of 68 lbs. per sq. in., the sample tested breaking at a pressure of 75.

As a heat absorption test, a 1½-in. sample 1 ft. square was illuminated by a concentrated beam of light coming through a lens from a 1,000-watt lamp. The illuminated spot showed a temperature increase from 25° C. to 75° C. in 17 minutes, while the rear face showed no increase from the original temperature. At the ultimate temperature a slight odor was noticeable, but when the test was repeated up to 52° C. no odor was perceptible.

Moisture Absorption Test

As a moisture absorption test, a piece of material with a hard skin was kept in water for 110 hours. Absorption was .4 per cent of water by weight. This was reduced to .002 per cent after exposure to room air for 48 hours.

To test for acid resistance, samples were kept in weak solutions of hydrochloric, sulphuric, and nitric acid for six days. After being wiped off, no changes in the structure of the material could be ascertained, Mr. Edwards stated.

Then to determine its sound-absorbing properties, a sample of the material with the skin removed and with the rough side exposed to a sound source, showed an average decrease of 20 decibels. This value was increased at low frequencies.

Samples Burn Slowly

American samples of the material burn slowly, Mr. Edwards reported, giving off a combined sulphur and rubber odor. It has been recently reported that the use of certain ingredients in the dough will produce a fire-resistant product.

The English factory has been producing Onazote for soft mats, insulation for airplanes, insulated containers for dispensing ice cream cooled by solid carbon dioxide, etc. One of the recent applications is the insulation of 125 refrigerator cars for the Great Western Railway, Mr. Edwards said in conclusion.

Table 2—Results of Tests

	Electrical Method, 80° F. Room	Electrical Method, 100° F. Room	Door Opening Method, 100° F. Room
Refrigerator			
Make	G. E.	G. E.	G. E.
Cabinet model	SS-67	SS-67	SS-67
Unit type	D-31-A16	D-31-A16	D-31-A16
Cabinet volume (Nema rating), ft.³	6.7	6.7	6.7
Cabinet air temperatures, °F.			
24 hour, grand average	43.2	49.0	48.8
Noon to 6 p. m., grand average	46.1	55.1	55.2
Average top	50.0	59.4	58.9
Average middle	44.0	53.4	53.3
Average bottom left	46.4	54.4	55.9
Average bottom right	44.0	53.2	52.8
1 a. m. to 7 a. m., grand average	39.7	42.5	42.1
Average top	43.7	48.2	47.9
Average middle	38.7	40.6	40.1
Average bottom left	38.8	40.6	40.1
Average bottom right	37.6	40.6	40.1
Ice making			
First charge, amount, lb.	2.15	4.30	4.30
Time, hour	4.5	3.5	3.5
Per cent frozen	100	100	100
Second charge, amount, lb.	2.15	4.30	4.30
Time, hour	4.0	4.5	4.5
Per cent frozen	100	100	100
Third charge, amount, lb.	2.15	4.30	4.30
Time, hour	4.0	4.0	4.0
Per cent frozen	100	100	100
Energy consumption, at 115 volts, kw-hr.			
24 hours	2.55	4.85	4.60
Noon to 6 p. m.	0.78	1.53	1.44
1 a. m. to 7 a. m.	0.43	0.69	0.66
Running time, per cent			
24 hours	41.0	80.8	77.8
Noon to 6 p. m.	52.5	100.0	97.0
1 a. m. to 7 a. m.	26.0	45.8	43.0
Machine temperature, °F.			
24 hours, top case	104	142	137
Condenser	96	124	120
Evaporator	20.1	16.1	16.8
Noon to 6 p. m., top case	109	151	145
Condenser	99	130	125
Evaporator	19.7	15.7	17.7
1 a. m. to 7 a. m., top case	97	128	124
Condenser	91	116	113
Evaporator	20.5	15.3	14.4

PROCESS FOR IRRADIATING MILK GIVEN BY PUTNAM

NEW YORK CITY—"Irradiation of Milk for Direct Expansion Coolers" was described by George W. Putnam, director of research for the Creamery Package Co. before last Wednesday's session of the A.S.R.E. here.

Irradiation is a process which increases the vitamin D content of milk by about four times to the extent necessary for growing children, he explained.

It does not affect the refrigeration load of a milk-cooling system, he explained to the refrigerating engineers, hence the subject is of interest not from the technical side so much as from the human angle.

Insufficient Vitamin D

Ordinary milk doesn't have sufficient vitamin D content to prevent rickets among babies, he said, an ailment which is much more prevalent than most people realize. Results of rickets are imperfect development of bones, teeth, etc. sometimes being manifest as bow legs.

Nature intended human beings to get their vitamin D from the sunshine, Mr. Putnam continued, but our complex civilization has greatly reduced the amount which people get from that source.

The system of irradiation described by the speaker was developed at the University of Wisconsin, and is available to dairies by payment of a royalty which amounts to about one-tenth of a cent per quart of milk treated.

The Wisconsin system employs one or two carbon arc lamps to which the milk is exposed for about 16 seconds as it flows for a distance of some 10 ft. in a thin film over a cylinder housing the arc lamp. The lamp draws about 3,000 watts, and the current flowing through it is used as an indicator of the amount of vitamin D being provided in the milk.

The process is not a substitute for pasteurization, he explained. It may be installed to irradiate before or after pasteurization, the most common method being to treat the raw milk just before pasteurization.

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Lansing, Michigan

Functional Classifications of Unit Air Conditioners Discussed by Goodwin

NEW YORK CITY—Typical unit-type air-conditioning systems, their method of operation, and their functions were described by W. C. Goodwin of the Westinghouse Electric & Mfg. Co. at the meeting of the American Society of Refrigerating Engineers held here last week.

Unit air conditioners, Mr. Goodwin declared, may be classified according to their functions, which are as follows:

Year around—air cleaning, air circulation, supply of make-up air from the outside.

Summer—cooling, dehumidification.

Winter—heating, humidification.

Some systems may have all of these functions and others may have only certain combinations of them. For example, unit conditioners for the summer may have only cooling, dehumidification, and air circulation.

Inlet for Fresh Air

"The year 'round unit," Mr. Goodwin stated, "generally has an air inlet for the air being circulated from the room and an air inlet from the outdoors to admit, under control, a certain portion of make-up air to be mixed with the circulated air.

"The air is cleaned to some degree either by mechanical filters or by water washing. The air is circulated by motor driven blowers or fans.

"Humidification is generally obtained by evaporation of water or air entraining moisture in the air path from water sprays, or wetter surfaces. Dehumidification is obtained by lowering the temperature below the dew point and condensing out moisture. The lowering of temperature is done either by passing the air through water sprays or over cold surfaces, such as finned tubes.

Heating of Air

"Heating is generally obtained by passing the air over steam or water heated surfaces. Heating may also be obtained in some types by the use of the reverse cycle of refrigeration.

"When surface cooling is used it may be by direct expansion in the surface unit, or by circulation of cold water or brine, obtained by refrigeration in a remote or central plant. Or the water may be obtained by ice melting or directly from the water supply when a low temperature is available. Some units obtain cooling by passage of air directly across the ice.

"In most cases there is a provision for a drip pan or container with a drain to take away the condensed moisture of dehumidification, or excess moisture of humidification not taken up by the air. The conditioned air is discharged into the room at velocities such as to insure adequate distribution over the room, but without producing drafts on the occupants."

Operation of System

Using the Westinghouse unit air conditioner for an example, the speaker described the operation of a typical system as follows: the recirculated air is taken in at the air grilles at each side; outside air is taken in through adjustable duct inlets on the rear. Air is circulated by motor-driven fans.

Cooling is obtained by passage of air over finned-tube surfaces, the tubes of which act as a refrigerant evaporator. Heating is obtained by passage of the air over the heating coil in which is either steam or hot water. Humidification is obtained by passage of the air through a water spray produced by two thin streams of water against a target.

Dehumidification is obtained by the condensation of moisture on passage of air over the cooling surfaces. Air cleaning is obtained to a degree by the mechanical filter. Air is delivered at the top to the room.

Conditioning units, Mr. Goodwin pointed out, are generally not wholly self contained. Westinghouse, he said, has developed a motor-driven compressor with condenser, liquid receiver, and necessary control units mounted corporately, which might be interpreted as a step in the direction of a self-contained unit. If the refrigerant condensing unit is built into the same cabinet with the summer air-conditioning unit, the unit may as desired be fully self contained.

Rating Air Conditioners

"It is common practice," said the speaker, "to rate air conditioners for heating in B.t.u. per hr. or ft. of heating surface in line with standard practices in other forms of domestic heating apparatus. For cooling, the practice is to rate them in B.t.u. per hr. at a given dry- and wet-bulb temperature of air entering the unit, and at a given refrigerant temperature within the cooling element, stating a certain relation between sensible and latent heat.

"Ratings of such units are sometimes expressed in tons, but no standard basis for rating air-conditioning equipment has yet been adopted. Manufacturers tables are generally available for each apparatus for various temperatures of cooling medium such as water or brine, and with various rates of flow of this medium.

"Each unit has generally a definite rating with respect to its air volume or various air volumes, and any further standardization is difficult.

"In applications it is important that the air conditioner and condensing unit, and multiples thereof, are adequate to each other. The rating of the total equipment is dependent on the parts of the system being properly matched. The market now contemplated for these machines in various sizes runs up to 10 to 12 tons per day."

Location of Apparatus

In locating the apparatus, consideration should be given to:

1. Arrangement of people in the room.
2. A convenient place for mounting unit conditioners.
3. Convenient places for mounting those units which require outside air supply.
4. Convenience of piping and wiring connections.
5. Air distribution.
6. Convenient, or possible, locations of condensing units or boilers.

The number of units and their location should be such that the discharge of air will not be directed at the occupants, that the air shall be distributed uniformly over the entire room, and that the return air to the unit shall be at comparatively low velocity.

Location of Units

Units with outside air supply if floor mounted are generally located below windows, and the suspended types are generally placed above show windows or at places where a short duct may be run to the outside.

The control may be by individual units or in groups. One of the advantages of the unit type is that control to suit the taste of the occupant is more easily obtained. The control may be either manual or automatic by thermostatic, hygrostatic, or other means.

"In estimating on unit installations, the same factors concerning heat gains and losses are used as in estimating for all types of comfort cooling," the speaker declared.

Sensible Heat Gains

"In each negotiation or installation a survey must be made of the conditions and the heat losses calculated. In cooling estimates, the sensible heat gains consist of:

a. Sunlight load.
b. Radiation load.
c. Infiltration load, depending on air changes.
d. People.
e. Lights.
f. Electrical motors and appliances.
g. Steam and gas appliances.
h. Any other heat load.

"The latent heat load must be separately studied, consisting of moisture loss from the drying of air, from people, and materials. In the case of heating, losses consist of the loss through the walls, etc., infiltration of cold air, and humidification by definite amounts of water, etc.

"The types, styles, and sizes of unit air conditioners are many and different, but in selecting or specifying unit type, the results to be accomplished should be studied. If only certain of the air-conditioning functions are desired, simpler and cheaper units can be used, but it should be borne in mind that only those functions are being obtained.

"Cost is the primary practical consideration now, and as with other pioneer developments we cannot foretell what it will be under truly mass production conditions and well codified distribution methods, literature, etc.

"The performance loads and costs can be worked out from common information and other studies, varying too widely to warrant my going into the subject here. In both regards, however, we can be sure of reduced costs in the future."

FACTORS IN SPOILAGE OF FOOD DESCRIBED

NEW YORK CITY—Five factors affecting the deterioration of meat in storage were enumerated by Prof. P. K. Bates of the Massachusetts Institute of Technology in his talk on "Foods in Commercial Storage" before the A.S.R.E. convention here last week.

These were:

1. Microbic infection.
2. Temperature of the storage room.
3. Relative humidity of the air.
4. Velocity of the air.
5. Reaction of food with the air—development of rancidity, discoloration, etc.

Pointing out that not only sufficiently low temperatures are desirable for food storage, but that *constant* temperatures are also important, Prof. Bates explained that variations in temperature tend to increase deterioration of foods in humid air because of the moisture condensing on foods at the lowered temperatures.

The rate of evaporation from foods depends chiefly on the combination of air velocity and relative humidities, and for all practical purposes these two factors should be considered together, the speaker averred.

If you are using a high humidity you can increase velocities of the air, while if you are using a low humidity you must cut down the velocity to avoid dehydration, he declared.

At the conclusion of Prof. Bates' paper, Prof. A. W. Ewell of Worcester Polytechnic Institute told about a process used by Birdseye to ripen foods for quick freezing, in which temperatures from 55 to 60° F. were employed.

Rayon Plant Uses Air Conditioning

NEW YORK CITY—The function of air conditioning in a rayon manufacturing plant was described to members of the American Society of Refrigerating Engineers at their meeting here last week by W. C. Giles of the Viscose Co., Marcus Hook, Pa.

Air conditioning, in one form or another, is used in practically every step of the rayon-making process, Mr. Giles demonstrated.

Rayon is manufactured from wood or cotton pulp or a combination of both. Pulp is cut into sheets of desired size in a room where humidity is kept constant to maintain uniform moisture content.

In the next major step a mixture of soda and cellulose is placed in shredding machines and the mixture shredded into crumbs. At this point temperature control is used as the shredding machines are jacketed for the circulation of brine, which controls the temperature of the mixture as it is shredded. Also, air supplied to the shredders is dehumidified, absorbing moisture from the agitated crumbs and assisting in temperature control.

The crumbs are removed from the shredding machines, packed in containers, and placed in a room where temperature is controlled within a degree while the crumbs are allowed to mature. In this particular department temperature control is by the manual operation of brine and steam coils.

Experience has shown that with the constantly changing location of material in this room due to containers being brought in and others removed, better control can be obtained by hand operation of numerous valves, each controlling a small part of the room. With steam and brine available immediate change of temperature can be obtained in any section of the room.

Following this the crumbs are transferred to a churn where they form what is known as zanthate. Air-conditioning equipment in this department serves to maintain a constant temperature in the room, takes care of any chemical heat generated in the churn, and provides ventilation for the room. Due to the temperature maintained refrigeration is necessary in hot weather.

After churning the zanthate is transferred to a mixer where it is formed into liquid viscose. The mixing operation is carried out under accurate temperature control, as the mixers are jacketed for the circulation of brine.

After the viscose solution is filtered in a room maintained at even temperatures it is ready for the spinning process, in which the solution changes from a chemical to a textile. Air conditioning is called upon to take care of several conditions in this step.

First there must be furnished to the spinning room sufficient air both for ventilation and to make up for the air constantly being exhausted from the spinning machines to carry off acid fumes. Also, the humidity of the air supplied must be sufficient to preclude the possibility of crystal formation from the acid vapor inside the spinning machines and on the thread.

After the rayon is removed from the spinning box, air conditioning is called upon to maintain an extremely humid atmosphere to prevent crystallization.

The rayon is next reeled into the skein form, and here air conditioning is necessary to maintain a humidity such that crystal formation from the acid still remaining on the threads will not occur on the equipment used for reeling.

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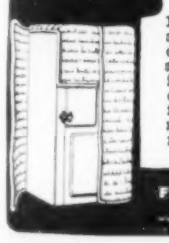

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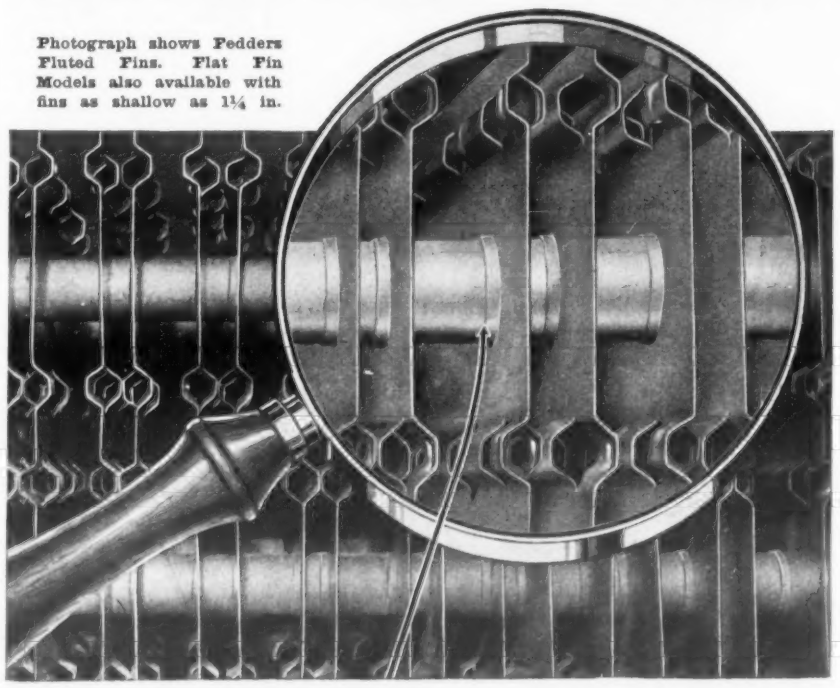
Photograph shows Fedders Fluted Fins. Flat Fin Models also available with fins as shallow as 1¼ in.



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3. Fedders exclusive Metal-to-Metal Bond increases and maintains lifelong efficiency.
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5. Fedders is the ONLY manufacturer building COMPLETE COMMERCIAL LOW SIDE ASSEMBLIES (Non-Frost Evaporator and Thermostatic Expansion Valve).

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Because it is evidence of the acceptance of Fedders principles of design by the industry.

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Because Fedders Non-Frost Evaporators are the result of 37 years of engineering and manufacturing experience in building heat transfer equipment.

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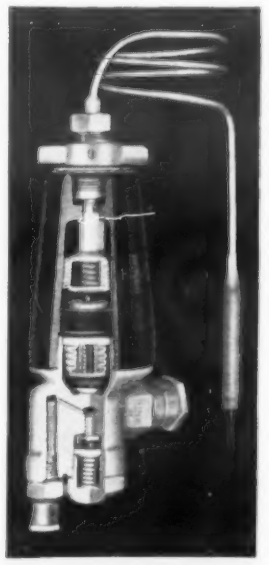

Cutaway view showing the Fedders Improved Model 33 Thermostatic Expansion Valve. Patents Pending.

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Compact, Light Weight, and Reliable Equipment Needed for Railway Air Conditioning

(Concluded from Page 1, Column 5)

coal to carry one ton of equipment for a thousand miles (based on $4 coal and 175 lbs. coal/1,000-ton miles).

"3. Reliability is probably the most important requirement, at least in the minds of men in the operating and traffic departments. Once a car leaves the yards on an assigned run, it gets little or no attention insofar as this part of the equipment is concerned, until it has reached the coach yard of the other terminal or has returned to its starting point.

"In view of the class of labor used by the railroads and the type of tools commonly found in railroad shops, it is evident that equipment requiring very fine adjustment or using delicate parts is not suitable.

"4. Accessibility of parts requiring inspection or adjustment is highly important in securing proper maintenance and in reducing the time out for inspection and repairs.

"5. Obviously from the standpoint of the passenger, the car must be adequately cooled, but not over-cooled, and free from objectionable drafts. In view of the shape and arrangement of the typical railway car, proper air distribution presents a problem quite different from that encountered in theater or other stationary applications. Due to the car construction, return air ducts cannot be used. As a consequence the return air opening must be located adjacent to the cooling unit in the clerestory of the car.

"In a railway car the draft problem is a particularly difficult one, since even though ducts are used the cooled air can be admitted only at points very close to the passanger. Since the cooled air in practically all cases can be admitted to the car only from openings near the ceiling, the temperature of the conditioned air, its velocity and direction must all be correct if a cold draft down the passenger's neck is to be avoided.

"6. Quietness of operation, at first thought, would not seem to be of particular importance on a railway train, in view of the generally high level of noise when the train is in motion. However, quietness is very important, particularly on Pullman cars which are parked for night occupancy.

Power Requirements

"7. Power requirements must be kept at a minimum consistent with reasonable weight and cost, not so much because of the cost of power, although this is important, but because of conditions peculiar to the railway application.

"8. Low first cost is, of course, a fundamental requirement which the railway application must meet in common with others."

In general, the speaker stated, all equipment now in service can be placed in three distinct classes, as follows:

1. Ice.
2. Steam jet.
3. Mechanical.
   (a) Direct axle drive.
   (b) Electric drive.

Two sources of power are available, namely head end, from the locomotive, or an auxiliary power plant, or individual generators and batteries on each car. Where steam is used for refrigeration, head-end steam supply is a logical choice. For electric power, the head-end system does not offer as many advantages.

Axle-Driven Generators

The axle-driven generator system, with a battery for stand-by power, is almost universally used at the present time for car lighting, Mr. Sahlmann pointed out.

Although the cost and maintenance are high, yet when all things are taken into account it is without a doubt the most practical system and certainly the most flexible, since the car has power available at all times, either standing or in motion, and irrespective of the train make-up or the type of motive-power.

The axle-driven generator as used on cars for lighting only, varies in size from 2 to 5 kw. with a few machines of 7.5 kw. rating and in general can be successfully driven by a flat belt from a car axle, although maintenance in winter presents serious problems.

When air-conditioning equipment is used, the electrical power demand including 3 kw. for lighting is approximately as follows:

Ice	4 kw.
Steam	6 kw.
Mechanical	
Direct Drive	4 kw.
Electric Drive	12 to 15 kw.

"By way of explanation it should be pointed out that these figures do not represent the total additional power needed in the locomotive," the speaker declared. "Of all the systems used, ice affects train performance least, due to the fact that power is not required for producing refrigeration, as in the case with other systems, which, except for differences in efficiency, affect train performance to practically the same extent.

"Depending on the service in which the car operates, the size of battery and generator must be increased. With the ice and the direct-drive mechanical system, it is frequently possible to use the same generator or the next larger size, up to 5 kw., which is generally considered the maximum capacity which can economically be driven by a flat belt.

Steam System

"For the steam system, a second generator is frequently used, together with a larger battery. For the steam and the electric mechanical systems, the increase in electrical demand is such that a single conventional generator with flat-belt drive for lighting and air conditioning is not practical. Various types of so-called 'positive' drives are now available for this service. The total connected load on a system of this kind, including lights, may be from 12 to 15 kw.

"Wayside power to provide for precooling is to be had in three forms, namely as steam, low voltage d. c. and 220 or 440 volt, 3-phase, 60-cycle alternating current.

"For the steam-jet system, steam for pre-cooling must be supplied either from a locomotive or from the yard steam lines.

"In most yards the steam plant is shut down during the summer months, with the result that if steam is to be used from the yard steam lines for air conditioning, the steam plant must be kept in operation solely for this purpose. Even though the steam lines are available the cost of steam power for pre-cooling will be comparatively high.

"Low voltage d. c. power (32 or 64 volts) is available in most terminals and yards for battery charging."

The present comparative popularity of the ice system is due to several reasons, Mr. Sahlmann declared. The first of these is undoubtedly its lower first cost, which, depending on constructional details and methods of accounting used, varies from approximately $2,000 to $4,500 per car completely installed.

The ice system, since it adds only about one kilowatt in electrical load, frequently can be used with existing generators and batteries, although the charging problem then becomes more difficult, particularly on diners where runs are usually short and layovers long with frequent pre-cooling periods.

The weight of such equipment completely installed varies from 3,300 lbs. to 5,500 lbs. per car, to which must be added the ice load of 1,500 to 4,500 lbs., giving a total weight, including a full charge of ice, of 4,800 to 10,000 lbs. per car.

The labor problem comes into the foreground, as enough men and trucks must be on hand to load all the bunkers simultaneously, if long train delays are to be avoided.

Purely from the total operating expense standpoint (including fixed charges) the ice system is best suited to service where the total ice consumption per season is small, due either to light cooling duty or a short cooling season, or a combination of the two.

The steam-jet system, as developed for railway cars, has now been in use for two seasons and in general the equipment has proved to be reliable, requiring but little maintenance the speaker said. Although it has certain inherent limitations from the operating standpoint, due to occasional unavoidable low boiler pressure or drop in the train steam line which limits the number of cars in a train which can be cooled, and the fact that station steam facilities must be operated in the summer for pre-cooling, nevertheless it seems reasonable to believe that the steam-jet system will continue to be used.

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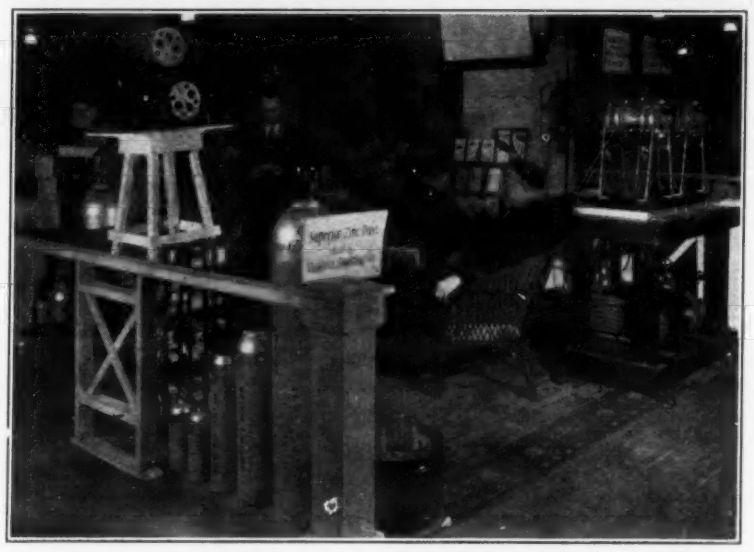


Booth of Virginia Smelting Co. at the Chemical Industries Exposition held in New York last week. At the right is a demonstration of SO-2 and methyl chloride boiling under glass (see story on page 1).

DeRemer Explains Mercury Type Compressor

NEW YORK CITY—Improvement in methods of applying the principle of the Archimedes screw pump to mercury gas compressors was the subject of J. G. De Remer when he addressed the American Society of Refrigerating Engineers here last week.

Early in his address, he pointed out that by employing rotational forces and using a dense liquid such as mercury, not only will high compression result, but the bulk of the screw and propelling liquid will be kept at a minimum.

The mechanism, if properly designed, may be such that the cylinder in which the screw and propelling liquid operate does not rotate at all. Instead, the liquid rotates around the inside of the cylinder, guided by the screw and impelled by centrifugal force.

After outlining progress made in development of the mercury gas compressor by the Savage Arms Corp. after the World War, Mr. De Remer went on to describe the work done by him and G. W. Dunham since 1930 to make possible the use of higher speeds and smaller cylinders in the compressor.

In models used for experimentation —some of which had 1-in. cylinders, others 1½-in. cylinders—angularity to the principal axis of rotation was eight degrees. Direction of mercury travel in the screw was reversed so that it entered at the point most remote from the axis of rotation, and traveled toward the pivotal end.

As the mercury was returned to the low-pressure chamber, it was passed through a nozzle so designed as to resist pressure up to desired limits, Mr. De Remer explained. This nozzle does not permit the gas to short circuit or by-pass, provided there is sufficient mercury on the high-pressure side of the nozzle.

Said the speaker:

"Best results come from a maximum ratio of gas to mercury in the screw hence the nozzle is calibrated from this requirement rather than to prevent the gas from short circuiting through the nozzle.

Cylinder in mercury gas compressors, as designed by Messrs. De Remer and Dunham, is carried in a casing mounted directly on the motor shaft, main axis of both the machine and the motor being horizontal. Pivot end of the cylinder is carried on a ball joint which is in line with the axis of the motor shaft.

No tolerances closer than 1/1,000 in are necessary, said Mr. De Remer, and that only in the diameter of the screw and tubing which are shrunk together to complete the helical passageway. Pressure difference between two adjacent pockets in the eight-thread screw is only 15-20 lbs.

Non-Overloading

"Since this compressor depends upon laws of rotation, it is designed to produce a maximum pressure at a certain speed, and will not exceed this pressure," said the speaker. "The compressor is hermetically sealed."

Pointing out advantages of this type of compressor, Mr. De Remer said:

"No other compressor has been developed which requires no lubrication in contact with the gas to be compressed, is hermetically sealed, and yet can use a standard motor external to and detachable from the device. Motors may be changed as required.

"There is nothing to wear which will in any way affect the pressure-volume characteristics of the cylinder. There is no change in the capacity of the cylinder. Only starting duty on the motor is the acceleration of the rotating parts, compression beginning gradually as speed is attained.

Cool Discharge Gas

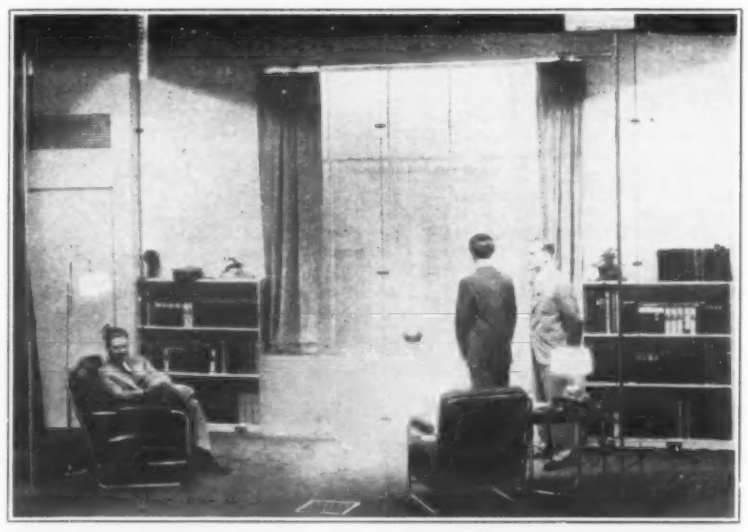
"Noise level does not change over a period of years. Another feature . . . is the low temperature of the discharge gases, conditions being substantially those of saturated gas at the point of discharge from the cylinder."

Stating that the models already designed have flooded evaporators and high-pressure float valves, Mr. De Remer pointed out that:

Since there is no lubrication in the refrigerating system, design and location of the float valve are simple, and that since the float valve may lead any amount up to the minimum capacity of the machine without impairing the service, the valve may be low in cost and simple in design.

To date, the mercury compressors have been used with ethyl ether, ethyl chloride, normal butane, isobutane, sulphur dioxide, methyl chloride, and dichlorodifluoromethane, said the speaker, and added that he expects the compressors to operate satisfactorily with ammonia and carbon dioxide.

Air Conditioning for a Robot



Although the telephone company's mechanical man at the Fair didn't mind the heat himself, his attendants did, and presently installed air conditioning.

CHICAGO—Although "Oscar," the dummy with the microphonic ears who starred in the Bell Telephone exhibit in the Communication building at A Century of Progress Exposition, managed to stand the intense heat generated by the big lights in his glass cage, the men who worked with him were not quite so tough. One lost 30 lbs. in three weeks. Four thousand watts of radiant energy from the big lamps in the cage were too much for human resistance.

But after the first few weeks everything was o. k. Air conditioning solved the problem and Oscar's human companions no longer suffered. Grilles were placed in the glass cage connected with Frigidaire air-conditioning equipment.

Oscar played to capacity houses at the Fair. Visitors sitting outside the glass cage put on telephone receivers and at once found themselves assuming the place of the dummy, that is Oscar. As the man working with Oscar approached and spoke, they heard the conversation just as Oscar did. For example, the attendant stepping behind Oscar, said "Please stand aside. I can't see." To the visitor, it seemed as if the voice came from directly behind him.

The secret lay in the placing of sensitive telephone transmitters in Oscar's ears. From the transmitter corresponding to the right ear ran a telephone line to the right ear of the listener. Similarly was fixed a telephone from the left ear. Thus the visitor was placed acoustically in the position of Oscar.

BUYER'S GUIDE

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There are no "yearly models" in PEERLESS FIN COILS. As experience dictates the PEERLESS FIN COIL is being constantly improved.

NO SOLDERED RETURN BENDS

The first fin coil to eliminate the soldered return bend with its trail of corroded and leaking joints, the PEERLESS now eliminates the soldered reducing nipple on the inlet and outlet connections of the coil. The ⅝" tubing of the fin coil is itself reduced to ½".

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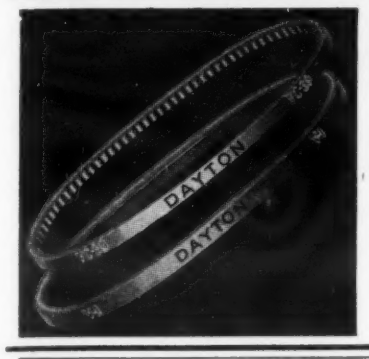
When you standardize on PEERLESS FIN COILS, you are always assured of an up-to-the-minute product.

PEERLESS ICE MACHINE CO., 515 W. 35th St., Chicago, Ill.



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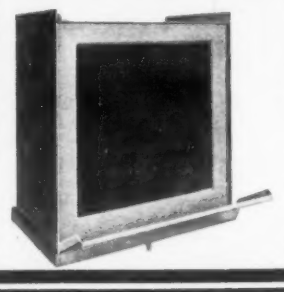

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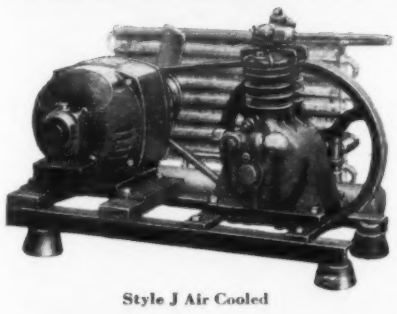

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QUESTIONS

Replacement Seals

No. 1447 (Service man, Ohio)—"Where can I obtain seals for use with worn crankshafts of compressors?"

Answer — Bridgeport Brass Co., Bridgeport, Conn.; or Rotary Seal Co., 809 W. Madison St., Chicago.

Technical Data Book

No. 1448 (Engineer, France)—"What is the latest technical book on commercial and industrial refrigeration?"

Answer—A good one is the Refrigerating Data Book, published by the American Society of Refrigerating Engineers, 37 W. 39th St., New York, N. Y.

Air-Conditioning Radio

No. 1449 (Dealer, Pennsylvania)—"Where can we obtain information on the Shelbourne radio which has an air conditioner within the cabinet?"

Answer—This is a new one on us; does anybody know of such a device?

Ice Cube Trays

No. 1450 (Distributor, California)—"Please give us names of makers of aluminum ice trays and disc or reed stampings."

Answer—For ice trays, write to Inland Mfg. Co., Dayton, Ohio, or the Hoosier Lamp & Stamping Co., Evansville, Ind. For steel disc valves, Detroit Stamping Co., 3445 W. Fort St., Detroit, Mich.

List of Manufacturers

No. 1451 (Wholesaler, Ohio)—"Where can we obtain a list of domestic refrigerator manufacturers in the United States?"

Answer—See page 302 of the REFRIGERATION DIRECTORY AND MARKET DATA BOOK.

Books on Small Motors

No. 1452 (Manufacturer, Wisconsin)—"What is a good reference book on single-phase fractional horsepower motors?"

Answer — "Fractional Horsepower Motors," published by McGraw-Hill Book Co., 330 W. 42nd St., New York, N. Y.

Accessories

No. 1453 (Service company, California)—"Who makes Ice Master ice crushers and Utilitongs?"

Answer—Ice Masters are made by Viking Products Co., 26 No. Cherry St., Akron, Ohio. Utilitongs are manufactured by Henry Paulson Co., 37 N. Wabash Ave., Chicago, Ill.

Valve Information

No. 1454 (Pennsylvania)—"Where can I obtain detailed information on thermostatically controlled ammonia expansion valves?"

Answer—Get a copy of "Automatic Control of Refrigeration" from the Alco Valve Co., 2628 Big Bend Blvd., St. Louis, Mo.

Servel to Manufacture Air Conditioners

(Concluded from Page 1, Column 1)

be available only through company stores in 1934, according to Vice President F. E. Sellman, while the Crusader (conventional) line of household electric refrigerators, which have previously been built chiefly for export, will be sold in America through customary distribution channels.

Mr. Sellman is conducting the sessions, assisted by Carroll Miller, Servel sales manager, and George Roach, Electrolux sales manager.

BROILATOR TASTE TEST HELD IN BOSTON

BOSTON—Gas companies in Boston, Worcester, and Providence are conducting a series of "taste test demonstrations" featuring the Broilator, gas-operated cooking appliance manufactured by Norge Corp. of Detroit.

Promoting the demonstrations is General Equipment Corp., Boston Norge distributor.

GRUNOW STARTS $500,000 EXPANSION PROGRAM

(Concluded from Page 1, Column 3)

double-action type, and are provided with air cushions.

Three ovens, each 300 ft. in length, are being assembled. In each oven will be baked one of the three coats of dulux finish used on the cabinets.

CHARLES C. KRITZER OF PEERLESS DIES

CHICAGO—Charles C. Kritzer, president and treasurer of Peerless Ice Machine Co., manufacturers of commercial refrigerating machines and fin coils, died here Tuesday, Dec. 5.

Sam Vining Joins Westinghouse Staff

MANSFIELD, Ohio—Vernon E. "Sam" Vining, formerly sales manager of Servel, Inc., and assistant sales manager of Grigsby-Grunow Co., has been appointed to the refrigeration division staff of Westinghouse Electric & Mfg. Co., according to R. C. Cosgrove, manager of the division.

Mr. Vining will head Westinghouse refrigeration sales operations in the department store and furniture store field, says Mr. Cosgrove, whose comment on the appointment was, "Owing to expansion of the refrigeration business through department and furniture stores, we felt it necessary to set up for this activity."

HARRY ALTER TAKES OVER GRUNOW DISTRIBUTORSHIP

CHICAGO—Harry Alter, who resigned Nov. 10 as assistant general sales manager of Grigsby-Grunow Co., has taken over the northern Illinois distributorship of Grunow radios and refrigerators, manufactured by General Household Utilities Co.

Mr. Alter acquired the Grunow Illinois Corp. from L. W. Cohen and organized Harry Alter, Inc., with show rooms at 203 W. Wacker Drive. He is president and general manager; Arthur Alter, his brother, is vice president and sales manager; and Seymour Rose is credit manager.

Space has been taken by the Alter company in the A. R. Thompson warehouse at 219 E. Illinois St., where service headquarters will be maintained, and products stored.

THERMODYNAMICS OF SO-2 DISCUSSED BY PHILIPP

NEW YORK CITY—That the thermodynamic properties of sulphur dioxide when used as a refrigerant in contact with a lubricating oil are considerably different than the properties of sulphur dioxide in contact with ferrous and non-ferrous metals was the premise of an address by L. A. Philipp of Kelvinator Corp.'s research department at the A.S.R.E. meeting here last week.

"Temperature-pressure solubility relationship between lubricating oil and sulphur dioxide varies to a marked degree with imposed conditions," said Mr. Philipp, who prepared his paper in cooperation with B. E. Tiffany, also of Kelvinator. "The solubility of gaseous and liquid sulphur dioxide varies with different lubricants."

Mr. Philipp pointed out that a careful technique is required in the assembly of a sulphur dioxide refrigerating system, and called special attention to a number of the precautions which must be taken in production of a good SO_2 assembly.

Best Physiological Air Contains 20% Oxygen

NEW YORK CITY—The "Physiological Side of Air Conditioning" was considered by R. R. Sayres, assistant surgeon general of the U. S. Public Health Service, Washington, D. C., in the joint meeting of the A.S.R.E. and A.S.H.V.E. last Thursday afternoon in the Engineering building here.

Mr. Sayres first expressed agreement with the A.S.H.V.E. definition of air conditioning which includes "simultaneous control of temperature, humidity, air movement, and purity."

For proper physiological reactions, air should have about 20 per cent of oxygen content, and less than 3 per cent of carbon dioxide. This carbon dioxide content can rise somewhat above that, but not to 8 per cent where breathing becomes difficult.

VON MEYER NAMED COPELAND COMMERCIAL MANAGER

(Concluded from Page 1, Column 1)

the ice cream cabinet sales division of Nizer and after the merger of that company with Kelvinator he was with the ice cream cabinet sales department of Kelvinator for six years.

He left Kelvinator to help found the Valerius Corp. at Jefferson, Wis., manufacturer of soda fountain equipment, and was sales manager and later general manager of that firm. In the fall of 1932 he joined Copeland Products, Inc., as head of the national users' department and was asked to join the staff of Copeland Refrigeration Corp. when that organization succeeded Copeland Products, Inc.

REFRIGERANTS EXHIBITED

(Concluded from Page 1, Column 4)

line to clog, pull a vacuum, and start the compressor.

Among the other exhibitors at the "chem show" were General Electric Co., Matheson Co., and Minneapolis Honeywell Regulator Co.

CLASSIFIED

PAYMENT in advance is required for advertising in this column.

RATES: Fifty words or less, one insertion $2.00, additional words four cents each. Three insertions $5.00, additional words ten cents each.

REPLIES to advertisements with box numbers should be addressed to the box number in care of Electric Refrigeration News, 550 Maccabees Bldg., Detroit, Mich.

INDEPENDENT SERVICE COMPANIES

HALECTRIC Thermostat repair service, Ranco, B & B, Two dollars each, one year guarantee, prompt service. Halectric Laboratory. 1793 Lakeview Road, Cleveland, Ohio.

2 Distributors Named By Automatic

NEWTON, Iowa—Graham-Reynolds Electric Co. of Los Angeles has been appointed distributor for Automatic washers and ironers in southern California, according to Roscoe N. Bradt, sales manager of the Automatic Washer Co.

Electric Appliance Co. of Ft. Smith, Ark., has been appointed distributor for Automatic washers and ironers in the state of Arkansas.

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